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ISOPAR

A NEW AND IMPROVED SYMBOLIC OPTIMIZING
ASSEMBLY ROUTINE FOR THE IBM 650

BY H. HERBERT HOWE



U. S. DEPARTMENT OF COMMERCE NATIONAL BUREAU OF STANDARDS

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H. Herbert Howe

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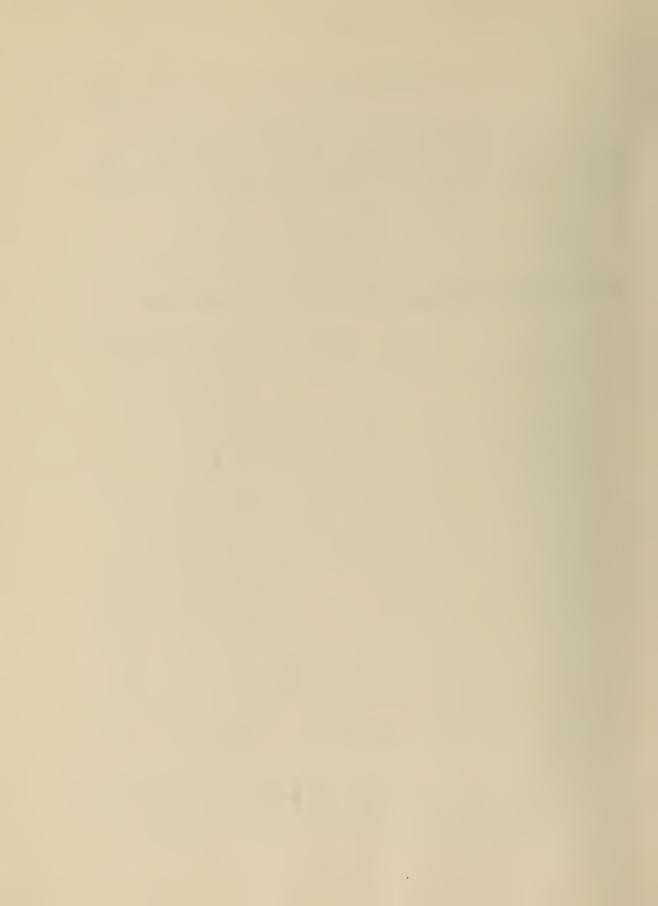
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ISOPAR, A NEW AND IMPROVED SYMBOLIC OPTIMIZING ASSEMBLY ROUTINE FOR THE IBM 650 *

By

H. Herbert Howe

I. Introduction

1.1. What an Optimizing Assembly Routine Does

The purpose of an assembly routine is to relieve the programmer of some of the problems of assigning storage locations to instructions, data, or "temporaries." When he wishes to refer to a storage location, he writes a symbol, which may be mnemonic, such as SINE; the assembly routine assigns a location to that symbol, and will use the same location whenever that symbol appears again. If it is inconvenient to use a mnemonic symbol, the programmer may select a symbol at random, which is used in the same way.

In the case of the IBM 650, an important feature of any assembly routine is that it should assign locations in such a way as to optimize the program as far as is feasible.

It should be clearly understood that three distinct codes are involved: (1) ISOPAR, which is the code actually being performed. (2) The input code, also called the "symbolic code," which is read and transformed one card or a few cards at a time. (3) The output code, or "object code," which is punched while the input code is being read. The object code is the one which will later be used to make the actual computations which are desired.

1.2. Equipment Needed with ISOPAR

ISOPAR follows its parent SOAP II in that it requires only a basic 650 plus alphabetical device, but it will assemble programs which use other optional features, such as indexing registers, floating point, tapes, printer, disk storage, etc. If the alphabetic device will accept special characters, the programmer has more latitude, but that

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feature is not essential. Other special devices are not used in the assembly, even if present. (See 6.3(c).)

1.3. Shortcomings of Previous Assembly Routines

IBM prepared a Symbolic Optimal Assembly Program, commonly known as SOAP, and later a modification called SOAP II. The present assembly routine is modified from SOAP II, but corrects two serious shortcomings in it, as well as several minor ones. On the other hand, ISOPAR still includes a number of known shortcomings, as described in 6. The two serious shortcomings of SOAP II will now be discussed.

1.3.1. Brevity of Remarks

The first shortcoming of SOAP II is largely a matter of control panels, and could have been remedied without much change in the code itself. SOAP II is inadequate in that only ten spaces are allowed for explaining a word of the code; and if the machine includes only the optional Alphabetic feature, but not the Special Character feature, these 10 columns of explanation can include no punctuation. The remarks are often so abbreviated that they suggest meaning only to the person who wrote them, and perhaps not to him after a little time has elapsed. ISOPAR allows 38 card columns for remarks, and they may include any symbols which the 407 will print.

This is accomplished by not trying to carry the remarks from input to output through the 650. Instead, a Reproducer board is permanently wired (see 3.2), and as soon as an ISOPAR code is run through the 650, the cards are run through the Reproducer to reproduce the remarks into the output cards. To simplify coding, this plan has been carried further, and all of the other information on the input cards is transferred to the output by the Reproducer; the only things punched by the 650 are the derived instruction, its location, a card number, and any punches necessary to control the 407 on the basis of defects found during assembly. Sufficient card columns for adequate remarks were obtained by giving up the quite unimportant feature that the output cards should be self-loading.

1.3.2. Deficient Optimization

The second serious shortcoming of SOAP II is one whose remedy required rewriting the entire program, although SOAP II served as a valuable guide throughout. (Since the program was being rewritten, other improvements were included; see 4.) SOAP II produces a program which is rather poorly optimized; the optimization of the output of ISOPAR is much better.

The trouble with SOAP II is that it always processes the cards and addresses in regular sequence: the cards as they reach the hopper, and the addresses in the order L, D, I. The shortcomings of this method of optimization are set forth clearly in IBM's "650 Data Processing System Bulletin: Basic Operation Codes, Program Optimizing, Program Loading," No. G24-5002-0 9/58. On pages 27-28, it is explained that for some operations the time of execution cannot be predicted, and, in order to optimize, one must go ahead to a fixed address and work back. This is just what ISOPAR does.

For example, consider the pair of words:

0000 14 ABC 21 SAVE 0020

where 0000 and 0020 are fixed addresses; that is, either absolute values, or regional values, or symbols for which a value has already been assigned when these words are reached. Assuming that its first-choice locations are available, SOAP II would assign values that would make these words read:

0000 14 0003 0013 0013 21 0018 0020

When this code is performed, the computer wastes 49 word-times between 0018 and 0020.

If operation 14 actually required exactly 10 word-times to perform (or 60, or 110), optimization could not be improved without changing 0000 or 0020. But 14 is not that kind of operation. The time which elapses from the moment it gets the divisor from memory location ABC until it stores the remainder in SAVE is large and variable. In any particular computation, there is a certain dynamic level which ought to be assigned to SAVE to make it fit with ABC; but each time the code is performed, that level will presumably be different. Except for the question of parity (a refinement which need not bother us at this point) any dynamic level is as likely to be suitable for SAVE as any other, so far as fitting it to ABC. (The blank address could be assigned any value, since in any case the second of these words will be in the program register before the division is finished.)

Now consider how these words would be optimized manually. You look ahead until you find a fixed address, and work back. In this instance, working back from 0020, the value 0017 is assigned to SAVE. This will fit ABC as well as anything else and gives the best fit with 0020. It will be seen that, on the average over many performances of the code, the two words will be performed in 49 word-times less than

if SAVE is made equal to 0018: the time interval between ABC and SAVE will be the same, on the average, and the time interval between SAVE and 0020 will always be 49 word-times less.

This is an extreme case. When we consider optimization of many different codes by SOAP II, we see that its method wastes an average of 24 1/2 word-times per division, as compared with the manual method, if we exclude from consideration those cases in which another variable-length order is reached before we get to a fixed address.

The same argument applies to other variable-length orders, such as multiply, floating operations, read, write. For floating add, the average waste would be somewhat less, because the optimizing addends used in SOAP II are such as will usually waste a few word-times but seldom an entire turn of the drum.

Summarizing, SOAP II wastes considerable time because addresses are always processed in the order in which they are reached. When a variable-length order is reached, it assigns a more or less arbitrary length to it, regardless of what the situation may be on ahead. Since, on the average, it makes little difference in computing time what address is put there, the manual method optimizes the address with relation to later addresses, so that no time is wasted when the next fixed address is reached.

ISOPAR follows the manual method. When a variable-length order is reached, it stops processing and reads in more cards until a fixed address is reached. Then it optimizes backward; then it punches forward. This takes more processing time than SOAP II, but produces a materially better optimized code. In the example cited above, ISOPAR would give, if its first-choice locations were available:

0000 1¹4 0003 1512 1512 21 1517 0020

2. Programmer's Guide

It is assumed that a person attempting symbolic programming, for use with ISOPAR or any other assembly routine, is already at least somewhat familiar with machine-language programming, and no attempt is made to discuss the meanings of the operations or the addresses.

2.1. Coding Form and ISOPAR Input

The ISOPAR input consists of one card for each word of code, with certain additional cards. These additional cards are headings used in listing the code, and cards which serve to guide the assembly. A complete list of the card types is given in 5.2.1.

Figures 1-2 show the coding form used for the ISOPAR input. Each line shows information that might appear in one input card. Numbers at the top show the card columns. It is to be understood that cards would never be used in the sequence and with the entries here used; this is, rather, an assembled collection of different types of cards, given in the order in which they are described in the text.

2.1.1. Column 16, Card Status

Column 16 may be used for a letter which shows the status of the card. Such letters may be omitted if desired, since they do not affect the assembly, and only K affects the 407 listing (by controlling spacing). The following letters are used:

K: The word is a constant, not an instruction. Q: A comparison constant, or the word used to restore a variable instruction after a constant has been subtracted. (Used often with the basic machine; seldom with a machine having index registers.) C: An instruction which is performed immediately after the one preceding it in the listing, and also after some other instruction. N: An instruction which is not performed after the one preceding it in the listing, but is performed after some other instruction. R: An instruction whose logical predecessor is not in the listing at all, but is built up somehow. P: A word used to preset or modify a variable instruction. J: Similar to P, in case the word appears in the code in the sequence in which it will be performed.

These letters are used in the listing of the ISOPAR code. It might be noted, however, that that code has so many interruptions to normal sequence that the value of the letters is rather limited.

2.1.2. Column 17, Card Type and Other Information

Certain of the possible card types are indicated by punches in column 17, and that column also gives some other information about certain cards.

A 1 in 17 indicates a "Comments" card. These are normally heading cards for use in listing, with one at the start of each segment of the code. The comments are written in columns 18-75. The ISOPAR assembly code passes over those cards without using them.

A 2 in 17 indicates a card of a relocatable subroutine. Each actual code-word of the subroutine has such a punch; but the subroutine's type 1 cards, if any, and its REQ and RBR cards do not use 2 in 17, nor does the associated REL card. (See 2.2.)

An X-punch (also known as ll-punch) in 17 indicates a negative word. It is normally used only with constants, including those with 2 in 17. It may be used in an ALF card, but not in a card with 1 in 17.

A Y-punch (also known as 12 or R) in 17 indicates a card of the availability table (2.3.7.). It is not part of the input, but is punched as part of the output, if a PAT card is used.

2.1.3. Columns 24-25, Operation

For every word that is to appear in the object code, there must be a line on the coding form and a card in the input code. The first two digits of the object-code word are entered in columns 24-25 (except in case of an ALF card, 2.3.1.), and are reproduced unchanged into 5-6 of the output card. If the word is an instruction, these digits show the operation; alternatively, they may be the first two digits of a constant. If the word is an instruction, these digits are also used during optimization.

2.1.4. Columns 23-25, Pseudo-Operation

The input symbolic code must also include some "pseudo-operations." A pseudo-operation is indicated by a 3-letter symbol in 23-25.

There are 13 permissible pseudo-operations, listed in 5.2.1. An illegal combination of letters will probably cause the assembly program to go astray. Actually, however, only the lower punches in columns 23 and 25 are used in identifying the pseudo-operations; for example, KAZ or SCI, or 279 would work just the same as BLR. A pseudo-operation is recognized by having blank 17 and non-blank 23.

Pseudo-operation ALF gives rise to a word of code, just as do cards showing actual operations. The other 12 do not. They are used, so to speak, to guide the assembly into correct channels.

Three of the pseudo-operations, BOP, PAT, and HED, are used with only columns 23-25 punched. All of the others require additional punching.

In case RBD cards are used, they must be at the start of the program, preceded perhaps by type 1 cards and a BOP card, but by nothing else. The other pseudo-operations may be used at any time, although normally all except HED also appear before the first card which produces a code-word of the object code.

2.1.5. Reservations

ISOPAR assigns addresses optimally, in cases in which the programmer has not specified the address. When an address is thus assigned, a note is made that that address is now "unavailable," so that it will not be reassigned.

It is always necessary, however, that certain words be in a predetermined relation to each other; e.g., the 10 words of a read band must be together. To make this possible, it is necessary at the start of a program to "reserve" certain portions of the drum, so that the assembly routine will not assign those cells to other uses.

Seven or eight of the pseudo-operations relate to reserving. Two of these are explained here, and the others are explained later.

When a pseudo-operation calls for reserving a location, it is reserved regardless of its previous status; when it is to be "unreserved," that too occurs regardless of previous status.

2.1.5.1. BLR, Block Reservation

Two varieties of BLR cards are illustrated. The first has its I address blank; the second has a four-digit number for I.

The first illustrated BLR card reserves cell 0306, making it unavailable for automatic assignment by the assembly routine. The second illustrated BLR card reserves all cells from 1296 to 1305 inclusive.

2.1.5.2. RBD, Reserve Band

RBD supplements BLR, and reserves large blocks of locations much more rapidly than does BLR.

The first RBD card shown in figure 1 reserves the entire band which starts with 0000, namely locations 0000-0049 inclusive. The second RBD card reserves 0600-1899 inclusive, and also 0000.

The number in the D-address must be a multiple of 50. If it is not, no reservation occurs.

The number in the I-address, if not blank, is normally congruent to 49 (modulo 50). If it is not, reservation extends to the end of the band in which that location lies. Should the I-address be smaller than the D-address, it reserves only one band.

RBD first reserves the initial location of each band, and then reads the next card to see if it is also an RBD card. At the end of the last RBD card, the reservations in the locations = 0 (mod 50) are extended to the following 49 locations. After that, it also reserves 0000, since that is nearly always desirable. To work correctly, all RBD cards must precede all the rest of the program except possibly type 1 cards and a BOP card.

2.1.6. Columns 18-22, 26-30, 32-36, Addresses

As in all 650 coding, three addresses must be specified for each word: L, the location into which the word is to be placed; D, the data-address in the word; and I, the instruction-address in the word.

In the input code, each of these addresses consists of five characters, and may consist of any combination of letters, digits, blanks, and special characters that is acceptable to the alphabetic input of the 650. Addresses are of four types, as explained later.

It has been found expedient to restrict the generality of the characters in an address. If, for example, an address consists of two consecutive non-blanks and three blanks, it may be hard to tell in a 407 listing which positions are non-blank, and errors have occurred from this source. It is better, therefore, for the programmer to adopt the rule that every address be either left-justified (first position punched) or right-justified (right position punched); or, of course, it may be both left- and right-justified.

The following conventions in writing addresses have been found aids to accurate key-punching. They are illustrated in figures 1-2.

Letters used in addresses are written as capital letters.

An address with fewer than 5 non-blank characters should be written crowded against the left or the right margin of the space on the form, to show left- or right-justification, respectively.

A capital 0 is written with a bar over it; a zero with a slash through it. The latter may be omitted if the zero is with a group of other digits.

Digit 1 is indicated by a single line; letter I has horizontal bars at the top and bottom.

A blank character within an address is indicated by a small b. Should the programmer desire to have a symbol that is blank at both ends, it should be written with b's at one end to clarify the punching requirements.

2.1.6.1. Absolute Addresses

If the first character of an address is blank and the other four are digits, it is an "absolute address." Such an address is reproduced into the corresponding output card unchanged, unless it is tagged for indexing. If it is a true address, it must of course be a valid one (e.g. for a basic 650, it must be 0000-1999, or 8000-8003). It may also, however, be part of a constant.

ISOPAR reserves an absolute drum address if it is L, since such an address always signifies a location that is being used. (To make the reservation meaningful, the word would have to appear near the start of the code. This is feasible, for example, with constants for which L is absolute.) Absolute D and I addresses are not reserved, (except in relocatable subroutines, 2.2), because such addresses are often parts of constants, or are not true addresses as in operations 80 or 30; and it would reduce available locations to reserve them.

2.1.6.2. Regional Addresses

If the first character of an address is a letter and the other four are digits, it is a "regional address." Regional addresses are used when the programmer knows that a certain group of words must be kept together in a certain sequence (e.g., a table of functions, or the 10 input words), but does not yet want to decide just where to put them. Later, before assembling the program, he will prepare a single REG card to define the region.

Any drum location may be described by a regional address referred to any region. If, for example, the region P is defined by saying that P0001 = 0177, then P0002 = 0178, P0003 = 0179, etc. Going the other direction, that same definition also implies that P0000 = 0176, P9999 = 0175, P9998 = 0174, etc.

2.1.6.2.1. REG, Regional Designator

For each region used in the program, there must be an REG card defining the region. It must appear before the first regional address of that region, and it is normally put near the start of the code.

The two varieties of REG card are shown in figure 1. Although columns 26-30 look like a regional address, the programmer must be careful to realize that they are not.

The first illustrated REG card specifies that the regional address POOOl is equivalent to 0177. It also causes location 0177 to be reserved.

The second REG card specifies that ROOOl is equivalent to OlOl, and it also reserves all locations from OlOl to OllO inclusive.

Since it is rare for one to want to use a region consisting of only one word, the first type of REG card is normally used in conjunction with an RBD card. Suppose, for example, region A is to extend from 0800 to 1787, inclusive. One could use a card REG A0800 1787, to specify that A0001 = 0800, and to reserve from 0800 to 1787. This card, however, takes an annoyingly long time to assemble. Assembly may be much hastened by using two cards:

RBD 0800 1799 REG A0800

This also reserves 1788-1799, which are not needed; if it will crowd the drum too much to leave them reserved, they can be unreserved with a BIA card.

The four digits in the D ADDR column of an REG card can be any number from 0001 to 9999 inclusive, although many of them would probably not be useful. The number 0000 cannot be used.

2.1.6.3. Blank Addresses

Addresses are normally left blank when the D or I address of one word is to be equal to the L of the next, and the programmer does not care what the address is. More generally, words for which L, D, and I are all given (e.g., constants) may intervene; also, pseudo-operations and type 1 cards may intervene. The following description will help explain the results which ensue when blanks are incorrectly used.

During forward processing, a blank D or I is filled optimally; and if both are blank, I is made equal to D. A blank L is made equal to the D or I that was last processed forward.

During backward processing, blank L is filled optimally, and blank D or I is made equal to the blank L that was last processed backwards.

Although a constant may follow a word with blank I without error in assembly, such an arrangement might impair optimization. If a constant is encountered during a forward search for a fixed address, the search will be abandoned. Usual practice is to put the constants at the end of the segment in which they are encountered, since the type I card at the start of the next segment will in any case cause the search to be abandoned.

When an equivalent is assigned to a blank address, the equivalent is reserved.

2.1.6.4. Symbolic Addresses

Any address that is not absolute, regional, or blank is a symbolic address. A symbolic address is assigned a drum equivalent when it is first processed; thereafter, the same equivalent is used, unless it is redefined (see EQU, SYN) or cleared out of the symbol table (see HED).

When an equivalent is assigned to a symbolic address, three things happen: (1) That location is reserved to prevent conflicting use. (2) The symbol is stored in the symbol table. (3) The equivalent of the symbol is stored at a corresponding place in the equivalence table.

By use of SYN or EQU, it is possible to preassign or reassign the equivalent of a symbol.

2.1.7. Columns 31 and 37, Indexing Tags

When a program is being prepared for a 650 equipped with indexing registers, it is not necessary to add the multiple of 2000 or 200 to the absolute address; and for best optimization, you should not do so. A "tag" is put in column 31 or 37 indicating which index register is to be used with a particular address. Permissible tags are 1,2,3, respectively, or A,B,C, respectively, or even J,K,L. The assembly uses the digit-punch only; or, if the column is blank, it uses zero.

The only types of address that could usefully be indexed are absolute or regional. Since indexing is for the purpose of access in turn to locations having a definite relation to each other, there are no circumstances under which it would be useful to index a blank or symbolic address, and ISOPAR ordinarily does not do so, even if a tag is provided in the input code.

ISOPAR decides whether the address is drum (add 2000, 4000, or 6000 for indexing) or core (add 200, 400, or 600) solely on the basis of whether the given address is less or more than $1999\frac{1}{2}$. No check is made on whether the unindexed address might erroneously be in the ranges 2000-8999 or 9060-9999.

In the tagged example shown in figure 1, if region P is as defined by the REG card above it: P0001 = 0177; P0000 = 0176; tag A causes addition of 2000, and the D address of indexed word comes out as 2176.

2.1.8. Columns 33-75, Remarks

Every card may have remarks punched in columns 38-75, explaining the purpose of the card. These remarks are not used in assembly, but show up if the cards are interpreted or listed. The remarks may be as extensive, within these limits, as suits the fancy of the programmer.

The dotted vertical line in the coding form shows where the remarks must end if they are written on an elite typewriter. In figures 1-2, the remarks overrun the line; they are not actually being punched in cards, but the space is used only to describe the card.

2.2. Relocatable Library Subroutines

A relocatable subroutine consists of a number of type-2 cards, and one or more REQ cards. At times, it also includes an RBR card and one or more type-1 cards.

The type-2 cards are written in absolute language, and are usually optimized better than can be done by any optimizing routine. This is warranted, as a rule, because the same subroutine will be used many times.

In all, three pseudo-operations pertain to relocatable subroutines.

The cards for relocatable subroutines are normally put near the beginning of the input deck, preceding all cards for which addresses are assigned optimally. This is necessary so that the locations to which addresses are relocated will not have been assigned by ISOPAR to other purposes before they are reserved during relocation. It would be possible to use a BLR card to reserve the space for the subroutine, but that is an unnecessary complication.

2.2.1. Format of Relocatable Cards

Each card is identified by a 2 in column 17. It may also have an X in 17, if the output word is to be negative.

All addresses must be absolute, and may be either drum or core.

Normally, drum and core addresses would be relocated by different amounts. Any relocatable address less than 2000 is interpreted as drum; any relocatable address exceeding 1999 is interpreted as core.

If an address is not to be relocated (e.g. the D address of operation 30 or 50, or the D or I "address" of a constant), the fact is indicated by putting some non-blank character in the left-hand position of the address. Most commonly, the letter "F" is used, signifying "fixed."

Such an address (see figure 2) resembles in form a regional address, but it is quite different. In fact, F0002 may have three quite different interpretations according to the type of card.

In an ordinary card, it signifies the second word of region F; in an REG card, it signifies that thereafter regional address F0001 = 0002; in a type 2 card, it signifies that the address is 0002 and that it is not to be relocated. In this last use, the first character may be a digit, a letter, or a special character, all of which produce exactly the same result. These three uses of F0002 are shown in figure 2.

A D or I address may be tagged for indexing, as in normal cards. An indexed drum address could not be written as, say, 2030, because it would then be relocated as a core address, not drum.

If L, D, or I is a relocated drum address, that location will be reserved. Hence, it is not necessary to reserve locations for a relocatable subroutine, provided it is assembled before the program starts assigning locations optimally.

Subroutines prepared for SOAP II may be used with ISOPAR by reproducing the cards, provided they meet the conditions mentioned in 4.1.1. In reproducing, columns 41 and 42 are combined into 17, and columns 43-72 are reproduced into 18-47. The resulting subroutine will have some superfluous cards, since in SOAP II it is necessary to reserve specifically all "temporaries."

2.2.2. REL, Relocation Indicator

In this pseudo-operation, columns 27-30 show the amount that is to be added to each drum address, whether L, D, or I: columns 33-36 show the amount to be added to each core address. For example, the first REL card of figure 2 would add 1200 to each drum address, and 0010 to each core address. If either of these fields is blank, it is interpreted as zero, as in the second illustrated REL card. These relocation amounts must be positive.

An REL card applies to all type-2 cards which follow it until another REL card is reached. Normally, the REL card will be placed immediately before the subroutine to which it applies. In any case, every subroutine must be preceded by an REL card.

If a relocated drum address exceeds 1999, or a relocated core address exceeds 9059, it will be left blank in the output. No check is made, however, on whether a relocated core address is less than 9000.

2.2.3. REQ, Relocatable Equivalence

Every relocatable subroutine must include one or more REQ cards; they do not have a 2 in 17. REQ is similar to EQU (2.3.5), but differs from it in two respects: (1) I must be an absolute address; (2) The I-address is modified by adding to it the amount indicated by the last REL card.

For example, the first REL card shown in figure 2 causes all drum locations to be relocated by 1200. If the entry to the subroutine is 0000 in the unrelocated subroutine, it must be 1200 after relocation. This is accomplished by the illustrated REQ card.

Note that the REQ cards are part of the standard subroutine. On the other hand, the REL card is prepared by the person using the subroutine on the particular job. REL must precede the entire subroutine, including the REQ cards.

2.2.4. RBR, Relocatable Block Reservation

This is like BLR, except that the reserved block is relocated by the amount indicated by the preceding REL card. This pseudo-operation was retained from SOAP II, where it had a use because relocated D and I addresses were not reserved. It is probably useless in ISOPAR.

2.3. Other Pseudo-Operations

2.3.1. ALF, Alphabetic Word

This is the only pseudo-operation which gives rise to a word of code. It is used to facilitate entering information which is to be punched alphabetically by the object code.

The quantity whose alphabetic equivalent is to go into the object code is entered under D ADDR. Under any ordinary circumstances, it will be necessary to specify the location in 18-22. An ALF card is ordinarily a constant, and is so designated in column 16.

The first ALF card in figure 2 will cause the number 00 61 87 00 00 to be put into location 0013, and the latter is reserved because it is an absolute L. The second ALF card will cause 00 00 00 00 00 to be put into the location whose symbolic address is PQ, which must already have been defined.

An ALF card may be negative. It is sometimes necessary to make an alphabetic word negative when printing with an on-line 407, the sign being used to control printing. Also, for punched output, it might be desired to have the sign punch in some non-alphabetic column.

2.3.2. BLA, Block Availability

This pseudo-operation causes a block of the drum to be made available, regardless of whether it was previously available or unavailable. Its format is identical with that of BLR.

The usual use of BIA is in connection with RBD. Suppose, for example, it is desired to reserve 0800-1698. This could be done with one card, BIR 0800 1698, but the operation will be much faster if two cards are used, namely

RBD 0800 1699 BLA 1699

Unless the drum is to be tightly packed, one would omit the second card, and let 1699 stay reserved.

A BLA card is not needed at the start of the assembly, since the entire drum is made available during initialization.

2.3.3. HED, Symbol-Table Clearer

This pseudo-operation is used to clear out of the symbol table all of the symbols which are used in just one segment of the program. This serves a triple purpose: (1) It is much easier to use a mnemonic symbol such as LOOP if it can be erased from the symbol table at the start of each segment of code. (2) It reduces assembly time by curtailing the search. (3) In some cases, it may be necessary to erase some symbols in order to have room in the symbol table.

Symbols are divided into two categories: "Long" symbols, which have a non-blank character in the right-hand position; and "short" symbols, which have the right-hand position blank. Whenever a HED card is read, all short symbols are deleted from the symbol table, but long symbols are left unchanged.

It will be noted that a "long" symbol might consist of but one letter or digit, provided it is right-justified.

It is customary to use a HED card immediately after each type 1 card (2.1.2), unless there is a specific reason for not doing so.

2.3.4. SYN, Synonym

This pseudo-operation causes the symbol written in the D ADDR position to be assigned the equivalent of the I ADDR. The latter may be absolute, regional, or symbolic; if regional or symbolic, it must previously have been defined.

Common uses of this pseudo-operation are: (1) When two different symbols are used in writing the code, and it is later decided that they ought to be the same. Use of SYN makes it unnecessary to go through and change one each time it is used. The SYN card must, for this use, appear after one of the symbols has been defined, but before the second

is used. (2) A symbol may be used for mnemonic reasons, but it is necessary to relate it to other addresses; this is done by a SYN card in which I is absolute or regional. (3) Occasionally, as in ISOPAR itself, symbolic temporaries which would otherwise have different values are given the same absolute value to conserve drum space.

If a symbol has been previously defined, it can be redefined with a SYN card, but this feature is seldom useful.

SYN works as follows: The I address is interpreted to give its absolute equivalent. The symbol in the D address is then made equal to that value. The absolute value of the I address is then reserved if (as is usually the case) it is a drum address; if not, the reserving procedure is skipped

The SYN card of figure 2 will cause right-justified X to have the value 0100, and 0100 is then reserved.

2.3.5. EQU, Equivalence

EQU produces exactly the same result as does SYN, which was just described. The reason for having two symbols is to minimize the conflict with SOAP II, where the two symbols worked differently as regards reserving. In practice, it appears that there is never any objection to reserving, although usually the location will already have been reserved. If in some rare case, the location must be left unreserved, the EQU or SYN card should be followed by a BLA card.

For example, the EQU card of figure 2 will cause the symbol AIPHA to be given the value previously determined for a left-justified BETA. This location will then be reserved, if BETA is less than 2000.

2.3.6. BOP, Beginning of Program

This pseudo-operation makes it possible to assemble two or more programs with a single reading of the ISOPAR code. A BOP card is placed between each pair of programs. In reproducing from input to output, note that, as its name implies, the BOP card is to be considered as belonging to the second code.

A BOP card at the start of the first program would be redundant, since the same presetting steps occur initially without a BOP card.

2.3.7. PAT, Punch Availability Table

The availability table, described in 5.2.3, is a 200-word table used by ISOPAR to remember which drum locations are available. The pseudo-operation PAT could be used at any time during assembly to cause

a punch-out of the table, but in practice it is not likely to be wanted except at the end of the assembly.

The output consists of 50 cards, each showing the 4 availability words of one dynamic level. Each card also contains 4 words to facilitate identification of the 4 availability words. The output has Y in column 17 (see 2.1.2), and may be listed on the same 407 control panel as is used for listing the ISOPAR input or output.

For example, the 13th card of the table shows the availability of all locations whose addresses are = 12 (mod 50). The first 10 columns are punched 00 0012 0462; the next 10 columns show the availability of locations 0012, 0062, 0112, ..., 0462, respectively, where a 1 means "available" and a 0 means "unavailable." Similarly, card columns 21-30 are punched 00 0512 0962, and columns 31-40 show the availability of 0512 (50) 0962. The rest of that level is similarly shown by the rest of the card.

2.4. 800X Instructions

Sometimes a card is inserted in which the location is an address such as 8002. Such a card will not stop the machine, but it is not used in optimizing the program.

3. ISOPAR Processing Instructions

This section discusses the actual technique of processing a symbolic code, once it has been written and punched into cards.

3.1. Assembly on the 650

3.1.1. Input Card Arrangement

ISOPAR deck: This is a 7 per card condensed deck. The cards are identified by serial numbers in columns 4-6, from 00l through 189.

Input deck which is to be assembled: Usually, but not necessarily, all of the pseudo-operations except HED are put at the start. These are followed by standard subroutines, and then the main code. Sometimes the order of the main code may be altered from the logical order, to improve optimization, for either or both of two reasons: If the parts done most frequently appear first, certain temporaries in the most-used part will be assigned locations to fit those parts, instead of to fit other places where they are used less often. Occasionally, such inversion is useful to give the most-used parts first choice of available locations.

Other input programs, if any, provided each of the latter is preceded by a BOP card.

Three blank cards, if desired, to avoid need for using End-of-File key.

3.1.2. Operation of the 650 Console

Storage Entry Switches: 70 1952 9xxx.

Control Switches: STOP RUN RUN PROGRAM STOP STOP, respectively.

COMPUTER RESET

PROGRAM STARI.

At the end of the assembly, it stops while trying to do operation 70.

If you wish to punch out the availability table, but have not included a PAT card, send control to 0010.

The starting point for performing the code is 0100, but transfer to that point is automatic.

Figure 3 shows the control panel to be used in the 533.

3.1.3. Programmed Stops

ISOPAR includes a number of programmed stops which would indicate defects in analyzing the different problems to be encountered. The only stops which are likely to occur are:

- Olll: Symbol table full. PROGRAM START will continue assembly, leaving a blank where a symbol has no equivalent. Each time an undefined symbol appears, the machine will stop again, until such time as a HED card clears part of the symbol table.
- 0222: Drum packed; i.e., no locations are available for blanks or new symbols. PROGRAM START will continue assembly, leaving blank any addresses which cannot be filled.

3.1.4. Other Stops

The most common stop occurs when a blank card is inadvertently put into the input deck. The minimum permissible punching is either a 1 in 17, with the other columns blank; or digits in 24-25, with the other columns blank.

If ISOPAR tries to process a blank card, the computer stops with the two middle digits of the distributor blank. The safest thing to do is to start over. If an MDF operation (see 5.1.1.(b)) has blank D, the machine stops with 00 0404 9998 in the program register.

3.1.5. ISOPAR Output

The output of the assembly routine consists of the assembled "object code," at the rate of one word per card. The format is as follows:

- 1-4 Location.
- 5-14 Code word; X overpunched in 14 if negative.
- 15 Control X.
- 76 Possibly a number to indicate a defect in the input code which made complete assembly impossible, as follows:
 - 3: An EQU or SYN card with blank or undefined I.
 - 7: L-address missing.
 - 8: D-address missing.
 - 9: I-address missing.

The following are some of the causes of missing addresses: Availability table full (i.e., no address available as equivalent to new symbol or blank address); symbol table is full, and there is no place to store the equivalent of a new symbol (remedy: use more HED cards); an absolute L address with an impossible value (e.g., 3168).

77-80 Card number. Only even numbers are used, to permit insertion of corrections.

There is a one-to-one correspondence between input cards and output cards, except for the availability table, if any. There must, therefore, be an output card for each input card that is not a code word, as well as for those that are. To permit the output code to be read into the 650, these extra cards must be readable by it. To do this without damaging the code, it is provided that each such card have 0000 01 0000 0000 in 1-14, with an identifying X in 9.

This puts a Stop order into 0000. It is well-known that it is undesirable to have a word of the code in 0000, as a check in case the program accidentally goes to a zero word. It is necessary to reserve 0000 before assembling the code, so that it will not be used elsewhere in the code; if there is an RBD card, it automatically reserves 0000. If, perchance, the code is permitted to use 0000, the X-9 cards must be sorted out before the code is used.

3.2. Reproducing Input Into Output Cards

It is customary, after the 650 run is completed, to reproduce columns 16-75 from the input cards to the output cards, so that one listing may show both input and output. A permanently wired Reproducer board for this purpose is kept on hand.

After those columns are reproduced, either the input cards or the output cards may be used to correct the symbolic code for later reassembly.

3.3. Listing the Code

The input or output code maybe listed on a 407 with the control panel illustrated in figure 4. The resulting lists are illustrated by the l/card lists of the ISOPAR code.

The output is often listed three times; between lists, the cards are sorted and the Alteration Switches are changed. Switch I is optional, N for double spaced and T for single spaced.

3.3.1. List 1, Logical Order

This set-up is also used to list the input code.

The cards are listed in logical order; in the output code, they are in sequence by columns 77-80. Alteration switches 2-6 are on N.

A type 1 card, signifying a heading to a new segment of the code, is preceded by a wide space, caused by a program change.

An extra space is produced whenever L of one word is not equal to I of the preceding word, in the symbolic code. An exception is made when both cards have K in 16. Hence, in following an assembled code, you can be sure that the words run in sequence so long as there is no extra space.

Symbolic addresses which are left-justified are printed slightly to the left of those which are not. This makes it easier to determine from a listing which card columns are punched.

On a store operation, both the symbolic and the assembled D-addresses are printed out in special columns, under control of a 2 in column 24. These make it easy to see when something is stored, and where.

Sometimes an emitted legend prints near the right margin, as described in the following paragraphs. BYPASS and BLANK print under control of punches in column 76 (3.1.5), and appear only in the output code. NOTE prints under control of punching in columns 18-36, and appears in the input code, or in the output code if the input code has been reproduced into the output cards. (See 3.2.)

BYPASS means that a SYN or an EQU card could not be processed because its I-address had not been properly defined.

BLANK means that L, D, or I is left blank because of one of many possible defects in the symbolic code.

NOTE signifies any one of several conditions in the symbolic code, which sometimes mean that an error was made in writing the code. Such signals should be investigated. Subject to the exceptions in the next paragraph, this word prints if any one of the following conditions exists: (a) The preceding card had both blank D and blank I. (b) Preceding card had blank I, and this card has non-blank L. (c) Preceding card had non-blank D and I, and this card has blank L.

Even if one of those conditions does exist, NOTE does not print if any one of the following conditions exists: (a) Run-out, and no card is printing. (b) Card has 1 in column 17. (c) Card has blank column 25. (d) Card is punched in column 23. (e) Preceding card was punched in 23. (f) Preceding card had blank 24.

3.3.2. List 2, By D-Address

Sort the cards on 7-10, and remove X-9 cards. Set Alteration Switches 2-6 on T.

The cards are listed in sequence by D-address, with an extra space whenever the D-address changes. This list is used when it is necessary to examine the uses made of a particular temporary location. Some of the cards for which the D-address is not a true address are omitted from the listing; namely, cards with K in 16, and cards with operations 00,30,01,31,05,35,06,36. When a card is so omitted, the spacing, including the extra space for change in 7-10, is handled as if the card did not exist.

3.3.3. List 3, By Location

For this list, sort the cards on 1-4. Set Alteration Switches 2-4 on T, and Switches 5-6 on N.

This lists all cards, in sequence by location, uniformly single or double spaced. It is used for studying what was initially in each location. By comparing lists 2 and 3, it is possible to study all uses made of any location, except instances where it is reached by modifying an address (with index registers, or otherwise).

4. Relation of ISOPAR to SOAP II

4.1. How to Use ISOPAR, If Already Familiar with SOAP II

In most respects, coding for ISOPAR is done exactly as for SOAP II, and a SOAP II symbolic code could be reproduced into different columns for use with ISOPAR. The exceptions fall into two categories: First, changes in coding procedure which must be made in order for the symbolic code to work; second, changes which are permissible, and knowledge of which will facilitate coding.

To reduce programming conflicts with SOAP II, it is provided that any pseudo-operation used in SOAP II will have meaning, although in seven cases the meaning is somewhat different from the SOAP II meaning. In addition, ISOPAR uses one new pseudo-operation.

4.1.1. Necessary Changes in Programming Methods

A person familiar with SOAP II code-writing must take the following differences into account to write an ISOPAR code:

- (a) All operations must be numeric.
- (b) Symbolic addresses are not allowed in type 2 cards (relocatable subroutines). They are, of course, used in REQ cards.
- (c) Minus signs must be X-punches. (SOAP II permits any punch.) In ISOPAR, the sign appears in the same card column as does the card type.
- (d) EQU and SYN produce identical effects: They reserve the location in question if it is a drum location, but do not try to reserve otherwise.
- (e) In type 2 cards, any non-blank character as the first character of an address makes the address fixed. An address is identified as core or drum solely by its magnitude before relocation.
- (f) Although HED has a quite different meaning, a SOAP II code with HED cards will work with ISOPAR unless a symbol headed in one segment is referred to in another segment.

- (g) On a long code, it will probably be essential to use HED cards and "short" symbols, lest the symbol table overflow. (With SOAP II, HED serves only to prevent duplication of symbols.)
- (h) Location 0000 must be reserved, unless the X-9 cards are to be sorted out before the code is used. This is no hardship, because 0000 should never be used in the code anyway. (If RBD is used with ISOPAR, it automatically reserves 0000.)
- (i) A card such as REG A0000, where 0001 of the region is to be location 0000, is inadmissible.
- (j) ISOPAR does not now provide for bading an availability table back onto the drum. This feature was in the program for two years, but no use for it was found. (With SOAP II, some users make up availability tables and load them initially as a quick method of reserving large blocks of memory; but with ISOPAR, pseudo-operation RBD accomplishes the same thing more conveniently and expeditiously.)

4.1.2. Permissible Changes in Programming Methods

In addition to the changes listed in the preceding section, those familiar with SOAP II should note the following differences between SOAP II and ISOPAR, some of which will materially simplify programming.

- (a) A new pseudo-operation, RBD, greatly shortens the time required to reserve large blocks of memory. It is explained in 2.1.5.2.
- (b) BLR, REG, RBR, or BLA may have blank I-address, if only one location is to be reserved or unreserved.
- (c) SYN may have a non-drum address in its I-position. With SOAP II a non-drum I causes trouble; with ISOPAR, it merely omits reserving. In ISOPAR, EQU and SYN are identical.
- (d) The function of HED has been changed. In ISOPAR, it clears out of the symbol table all symbols which are not right-justified. HED cards must be used in a long code, lest the symbol table become full; they should be used rather frequently, for the reasons given in 2.3.3. Be sure that the right-hand character in any symbolic address is blank, unless the symbol is actually used in more than one segment of the code.
- (e) Comments and remarks may be longer than with SOAP II. They may include any characters which the 407 will print, even those not acceptable to the alphabetic input of the 650.

(f) An address may consist of any combination of 5 characters acceptable to the alphabetic input of the 650, as explained in 2.1.6. The following examples illustrate the differences between SOAP II and ISOPAR in this respect:

Address	SOAP II Interpretation	ISOPAR Interpretation
bbbbb	Blank	Blank
C0001	Regional	Regional
CO00b	Symbolic	Symbolic
bl234	Absolute	Absolute
b123b	Stops machine	Symbolic
bABCD	Absolute, namely, 1234	Symbolic
bABCT	Stops machine	Symbolic
bbbbl	Stops machine	Symbolic
lbbbb	Symbolic	Symbolic

- (g) There is no need in ISOPAR to write out cards having L in the 800X series, and such cards do not affect optimization.
- (h) An absolute L address is reserved. If constants or other words with absolute locations are put at the start of the code, it is unnecessary to reserve their locations separately.
- (i) When a type 2 card is processed, any relocated address is reserved, whether L, D, or I. (SOAP II reserves only L.) This change probably renders RBR obsolete.
 - 4.1.3. Some Comments on ISOPAR Which Also Apply to SOAP II

There are a few places in which ISOPAR follows SOAP II, but the SOAP II manual is obscure or even incorrect. The following remarks apply to both of these assembly routines.

A word with blank D-address or I-address is normally followed by a word with blank L, and the assembly routines put the same absolute address into the two places. It is not essential, however, that the words be consecutive: They may, without error, be separated by type l cards, by pseudo-operations, or by code words in which L, D, and I are all non-blank. For ISOPAR, however, better optimization may occur if constants are put at the end of a segment rather than immediately after the references to them, because a constant encountered during a forward search will initiate the QUITT routine (see 5.1).

On pseudo-operations BLR, BLA, RBR, and SYN, a location is reserved or unreserved regardless of its previous status.

With an REG card, two distinct steps are involved. E.g., with REG A0175 0225, first 0175 is recorded as the equivalent of the regional address A0001, without reference to the size of the region. Then 0175 through 0225 are reserved, just as if it were a BLR card. This makes it clear why regional addresses have significance whether or not they are within the region originally reserved by the REG card.

A regional address may be made negative, by using complements; e.g., A9936 is an address 65 smaller than A0001.

The meaning of a regional address can be changed. This is done in the SOAP II manual: on page 87, REG D0923 0923 specifies that D0001 = 0923. On page 89, D0953 0953 means that thereafter D0001 will equal 0953 instead. It is necessary that the proper reservations be made initially, as is done on page 65.

The first character of a regional address must be a letter. An address whose first character is a digit or a special character (with a 650 designed to read special characters) is interpreted as symbolic.

An REG card in which the first character of the D-address is blank, numerical, or special character, will not define a region; but it will, nevertheless, reserve the specified interval. E.g., the two cards

BLR 0030 0070 REG 0030 0070

do exactly the same thing; namely, reserve from 0030 to 0070, inclusive. BLR could be abolished entirely; but to do so would not shorten ISOPAR by even one word.

4.2. Improvements in Optimization

There are a number of features in which ISOPAR optimizes a program better than does SOAP II:

- (a) The main improvement is in discontinuing forward processing when a variable-length instruction is reached, and searching for a fixed address from which to optimize backward.
- (b) A defect in optimization of indexed operations has been remedied. E.g., in SOAP II the symbolic word

0200 69 ABC 0031 A

is assembled with ABC = 0003, if the first choice is available. Since, however, one word-time is spent in interpreting the indexed I-address,

before it starts to perform the instruction, ABC should be 0004 (mod 50), and that is the value which ISOPAR supplies for it. This saves 49 word-times in the performance of such very rare instructions.

- (c) When an add or subtract instruction has a D-address of 8001, the time required is, on the average, one word-time less because the word is already in the distributor. ISOPAR optimizes to utilize this saving.
- (d) An indexing operation (50, 51, 80, 81, etc.) takes an extra word-time when a complement cycle is required. SOAP II allows an extra word-time under all conditions; ISOPAR saves it for those cases for which the complement cycle never occurs: I.e., operations 80, 82, 88, when the D-address is 0000-1999.

4.3. Available Drum Space for ISOPAR Program

SOAP II uses 1964 locations. The remaining 36 were not enough to meet the requirements of the extra steps involved in ISOPAR.

A considerable number of locations were made available by the innovation mentioned in 3.2: transferring input to output by Reproducer, not through the 650. This saves not only the transferring instructions, but also other words from the fact that input and output did not have to be packed so tightly.

Additional words were saved by more efficient writing of the code. For example: subroutines 4,5,6,8,9 of SOAP II were combined into one subroutine. A more efficient method of getting into subroutine 7 was used. The exits from various subroutines were combined into subroutine 10.

To make additional space, two features of SOAP II were dropped:

- (a) ISOPAR does not provide for symbolic addresses in relocated cards (type 2 cards). This is probably not a serious loss, although it may on rare occasions cause inconvenience.
- (b) ISOPAR does not provide for symbolic operations. Since some users may regard this as a serious loss, the point will be argued briefly. Any user of the 650 must learn the numerical codes anyway, if only to interpret the signal lights on the machine, or the results of a tracing routine. The three-letter codes used in SOAP II are much less mnenomic than the variable-length letter codes originally proposed by IBM; yet the user must learn them exactly, and not err by using the wrong letters. The result is that the user must learn exactly two arbitrary names for each operation, namely, the numeric and the symbolic.

By using only numerical operation codes, the problem of learning to code is actually simpler than if one must learn both systems. This change saved considerably more than the 100 words omitted from the symbolic-operation table.

All of these changes, however, did not make enough drum space available. Consideration was given to reducing the symbol table from 400 to 300 words. It was found, however, that 300 would often be too small; for example, ISOPAR itself uses more than 300 symbols.

In order to make the necessary drum space available, a fundamental change was made in the method of using the symbol table, with a concomittant change in the operation of a HED card. These changes, explained in the next section, made it feasible to cut the symbol table still more, and it now contains only 210 locations. ISOPAR has been used successfully for two years, and no instance of insufficient space in the symbol table has occurred.

4.3.1. Use of the Symbol Table

In SOAP II, the spot in the symbol table where the code first looks for a given symbol is a function of the 10-digit value of the symbol, the function being so chosen that changing any one character of the symbol will give a different location. The search for that symbol starts at that point, and proceeds upward. Ordinarily, within a short distance, either the symbol is found; or a blank place is found, which then receives the symbol. If the top of the symbol table is reached, the search continues at the bottom; if it then gets back to the starting point, the symbol table is full.

One obvious fact about symbolic addresses is that most of them are used only within a short range of the program. Only a few are used at widely separated places. In recognition of this fact, SOAP II uses the pseudo-op HED, which puts a specified character into the fifth place of any symbol whose fifth place is blank; hence, different segments of the code may be written without concern for duplication of "short" symbols, provided the different segments are "headed" differently. A symbol that is needed in more than one segment has its fifth character non-blank.

In order to obtain more space for the ISOPAR code, provision is made for clearing the symbol table from time to time of symbols that are used in only one part of the code; in this way, the symbol table can be made shorter. But when this is done, the SOAP II method of storing symbols cannot be used. Suppose, for example, the "function" of a symbol is 1756. Suppose when the symbol is stored, 1756 and 1757 are occupied; it is stored in 1758. Suppose that later 1757 is cleared out. The next time this symbol comes up, the code would find a blank at 1757, and conclude that this symbol was not in the table.

Hence, ISOPAR needed a quite different method, and the following was adopted: As in SOAP II, symbols used in only one segment of the code should be "short" symbols; i.e., with their last position blank. Symbols used in more than one segment should be "long"; i.e., with the last position non-blank. In SOAP II, a short symbol is "Headed" by a HED card; in ISOPAR, all of the short symbols are cleared out of the symbol table by a HED card.

Long symbols are stored in the symbol table starting with the first cell of the table and working upwards. Short symbols are stored starting with the top and working downwards. When a symbol is sought, the code starts at the appropriate end, and checks each cell in turn until the symbol or zero is found. To guard against the possibility that the entire table become full, one cell is left vacant at each end; when the search ends in a zero, a check is made to determine that it is in the middle, and not beyond either end.

By taking care to use long symbols only when necessary, and by clearing out the short symbols at rather frequent intervals, the search-time can be kept within reasonable bounds, although it will usually be somewhat greater than with SOAP II.

4.4. Improvements in the 407 Control Panel

Although not a part of the code itself, the 407 control panel used for listing a code is also important. The ISOPAR 407 control panel is described in 3.3. Here, we mention briefly those features which are improvements over the panel shown in the SOAP II manual for that program: (a) Wide space above a type 1 card. (b) Extra space when L does not equal I of previous card. (c) D-addresses of store operations printed in separate columns. (d) Alignment-shift between addresses which are left-justified and those which are not. (e) The legend "NOTE" is printed on input code as well as on output. (With SOAP II, the legend calls attention to errors only after assembly is finished.) (f) Alteration switches provide for modifications of spacing for three different lists, and for suppression of some cards on List 2.

5. Analysis of the ISOPAR Program

Throughout this analysis, when digits of a word are mentioned, the digits are counted from left to right: The left-most digit is digit 1, and the right-most digit is digit 10. This differs from the method used in the 650 manual and on the console; but it agrees with the method used in many other IBM publications, and is much more natural than counting from the right.

5.1. The Optimizing Procedure

ISOPAR normally assembles a code by considering the aidresses in the sequence in which they appear. Usually, L is known from some previous word; D is determined at an optimum distance from L; and I is determined at an optimum distance from either L or D, depending upon the operation. Then it goes on to the next word.

If, however, circumstances are such that it is impossible to optimize an address in this way, ISOPAR starts a "forward search" to find some fixed address from which it can process backwards to the point at which the search started. During the search, enough information must be stored about each card to permit reconstructing it.

The forward search may be terminated in either of two ways: (1) It may prove impossible to find a fixed address; then ISOPAR returns to where it started the search, assigns an address more or less arbitrarily, processes the stored-up cards forward, and resumes normal processing. This is the QUITT routine. (2) It may find a fixed address, whereupon the stored-up cards are processed backwards and the results stored; then these results are punched forwards. This is the BACKW routine. Thereafter, normal processing is resumed.

The different circumstances involved in these processes will now be given in some detail.

5.1.1. Circumstances Under Which ISOPAR Abandons Normal Processing

There are three conditions which cause ISOPAR to stop the normal processing and start a forward search. At the time it starts the search, it makes a note as to which condition initiated the search, because there are slight differences in the later assembly methods.

- (a) When L is a symbolic address that has not been previously defined. This is the start of a wholly new series of instructions. Any assignment of this L at this stage would be wholly arbitrary. Hence, it is best to look ahead for a fixed address, and work back.
- (b) When a variable-length operation (called M)F operation), such as multiply, divide, float, read, write, table look-up, is encountered. With most MDF operations, it does not matter whether the abandoning occurs after D, or after L of the next word, since I of the MDF operation may have any address whatever. However, operation 84 is different. Since L for that word is used after the table-look-up is completed, the machine cannot start looking for the I-address until after the operation is completed. Hence, for an 84 operation, normal processing should be abandoned and the forward search started between the D and I addresses. To simplify coding, the same procedure is used for all MDF operations.

(c) When a D address is indexed (for use on a 650 which has indexing registers). Since an indexed D address refers to a variable drum location, it is impossible to optimize the I of that word with respect to it. Hence, it is better to go ahead to a fixed address and work back to I. There is no need to start a forward search on indexed I, because the following L will surely be either a fixed address or a new symbol.

5.1.2. The Forward Search

When a card is examined during the search, there are three possible outcomes, which will now be discussed in detail.

5.1.2.1. Abandon Search (QUITT routine)

If it is impossible to find a fixed address to which to tie the stored-up cards, ISOPAR abandons the search, returns to the point at which the search started, assigns an initial address more or less arbitrarily, and processes the stored-up cards forward. The circumstances under which it does this are:

- (i) Storage region for storing cards is full. The region holds 15 cards.
 - (ii) Another MDF operation is reached.
- (iii) D is indexed; since its time of performance is variable, it is impossible to optimize across it.
- (iv) I is indexed, meaning that the next instruction is variable.
- (v) Card is of type 1 or 2, or is a pseudo-operation. Normally this is the end of a block, and will be followed by fixed L. (See 6.1 (e).)
 - (vi) An address is of the type designated as QUITT in 5.1.2.4.

5.1.2.2. Initiate Backward Processing (BACKW Routine)

Should a fixed address be found before any of the conditions listed in 5.1.2.1 occur, the search is successfully completed, and the code starts processing backward. Addresses considered "fixed" for this purpose are indicated in 5.1.2.4 by BACKW.

5.1.2.3. Continue the Search

If nothing occurs to terminate the search, it continues to the next card. In other words, the search continues if none of the special conditions listed in 5.1.2.1 occurs, and if the address is marked ON in 5.1.2.4.

5.1.2.4. Table of Types of Addresses

The following table shows the different types of addresses which may be encountered during the forward search, and shows, for each type, whether the address initiates the QUITT routine or the BACKW routine, or whether the search goes on. These decisions are subject to the rules in 5.1.2.1, which prescribe other conditions under which the search is abandoned.

Lin	e	_ <u>L</u>	_D*	<u> </u>	
1 2 3 4 5 6 7	Symbolic, not define		ON QUITT QUITT QUITT ON QUITT	ON BACKW QUITT BACKW ON QUITT BACKW	ON BACKW QUITT BACKW ON QUITT BACKW
8 9 10		, 8005-8007 (called 800X)	QUITT ON QUITT	ON ON QUITT	QUITT ON QUITT

*D is examined only if it is an address, excluding, for example, operation 30. Specifically, it is examined only if the first digit of the optimizing addend (5.2.7) is non-zero.

In the following explanation of the items in this table, an item is identified by its line number and column heading:

For lines 1 and 5, the address is wholly undefined, and the search continues. For 8D and line 9, the address is defined, but its dynamic level is not; therefore, the search continues for an address of fixed dynamic level.

When a fixed D or I is reached (2D, 2I, 4D, 4I, 7D, 7I), the search for a fixed address is successfully terminated, and we begin backward processing.

A fixed L (2L, 4L, 7L) may be reached by the search only if the previous D and I were unfixed. This means the start of a new block of words; the previous block cannot be tied to anything, and we might as well abandon the search.

If we reach an address that cannot be processed (lines 3, 6), the job will have to be done over anyway, and the easiest way of finishing it is best.

For 8I, the location of the next order to be performed is variable, and there is little point in trying to optimize through it. Therefore, the search is abandoned.

8L would indicate a mistake. If there were a word with 800X in L, it should follow one with 800X in I, and the latter terminates the search. (ISOPAR does not encourage the use of cards with 800X in L, and makes no use of them.)

10L is a programmer's mistake, since L cannot have such a value.

10D and 10T are normally parts of a constant. ISOPAR does not attempt to optimize backward through a constant; rather, we QUITT the search upon reaching one.

5L is really two cases. If the undefined symbol is different from any symbol used up to this point, it could just as well read QUITT. More commonly, however, an undefined-symbol L would be a symbol already encountered during the forward search, but not yet put into the symbol table because it has not been processed. We might have, for example:

0047	19	0200	
	45		Y
	46		Χ
	20	Tl	X
X	20	0100	

where 0100 is an address that has been fixed at the time operation 19 initiates a forward search. In this case, to QUITT and process forward from 0200 would assign to X a value that would be unsuitable with reference to 0100, and it is best to pass through the X, and then process backward from 0100. To simplify coding, it is provided that when L is an undefined symbol, the forward search always continues, irrespective of whether that symbol may have been encountered during the search. The only circumstance under which this might detract from the optimization would be if the storage area filled up before a fixed address was reached, but would not fill up had we started a new search with the symbolic L in question.

5.1.3. Some Methods of Backward Processing

During forward processing ISOPAR uses the same procedure as SOAP II: L is determined from some previous word; the optimum dynamic level of D is derived by measuring forward from that of L, and an available

location at or above that dynamic level is found; the dynamic level of I is measured from that of L or of D, according to the operation, and an available location for I is found.

The procedure is more complicated during backward processing, since there are several different cases. The program first examines the D and I addresses to determine whether they are fixed; the method of processing depends upon those two decisions, and also upon the type of operation. In explaining this procedure, we first discuss the methods of handling different types of addresses, and then consider the question of what constitutes a "fixed" address.

5.1.3.1. Sequence in Which Addresses are Processed

The operations encountered during backward processing (since MDF operations are excluded) fall into three categories:

- (a) Those in which D is not an address to be optimized (including all shift and indexing operations).
- (b) Those in which D is measured from L, and I is measured from D. These are considered under the name "arithmetic operations."
- (c) Those in which D and I are both measured from L. These will be considered under the name "branch operations."

The first backward card (the one which initiates backward processing) and the last one (the one which initiated the forward search) require special treatment, and will not be discussed here. For the intermediate cards, the sequence of processing the addresses is as follows:

Shift or indexing operation: D forward, I backward, L backward. Arithmetic operation, fixed I: I backward, D backward, L backward. Arithmetic, fixed D, unfixed I: D backward, I forward from D, L backward from D.

Arithmetic, D and I unfixed (An abnormal case, but could occur if D and I are new symbols referring to some point later in the program): I backward, giving an arbitrary address, D backward, L backward.

Branch, D and I unfixed (abnormal case): I backward, L backward, D forward.

Branch, D unfixed, I fixed: I backward, L backward, D forward. Branch, D fixed, I unfixed: D backward, L backward, I forward.

Branch, D and I fixed: Compute L backward from D and also from I, and then use whichever dynamic level is lower, where

"lower" must be interpreted with reference to a circular drum. This assures that if it branches equally often to D and to I, the time required will be a minimum.

5.1.3.2. Definition of "Fixed Address"

The definition of "fixed address" during backward processing is not the same as during the forward search.

After we have processed a blank L backwards, any blank D or I must be considered as fixed; for it will be the same as the L address of the following word, which will have been fixed by the time the given D or I is reached.

Core I is fixed under the same conditions, for an analagous reason Its dynamic level is the same as that of the following L, which has already been determined. A core D address, with branch operation, is fixed because it is normally associated with the L of the following word if that is also core. A core D address with arithmetic operation is unfixed, for it will work equally well at any dynamic level. It would be possible to improve the optimization of segments of code involving core addresses by a considerable expansion of the code to take a larger number of conditions into account. (See 6.1 (f).)

The full schedule of fixed-unfixed addresses may be found by studying the one per card code under "Backwards Routine," lines 696-734.

5.1.3.3. Optimizing Addends and Subtrahends

Words 0800-0899, shown in the one per card listing of the program (lines 110-308), and described in 5.2.7, give the addends required for forward optimization. Two addends are given, which are often equal, and never differ by more than one. The first addend is used if the augend is even; the second if the augend is odd. The following examples illustrate how they work:

Augend	Addends	Result
0000	5/4	0005
0001	5) ₄	0005
0002	54	0007
0003	54	0007
		,
0000	43	4000
0001	43	000;4
0002	43	0006
0003	43	0006

Now look at this table from the point of view of backward processing. For the case where the addends are 54, if we start back from 0005 we could go to either 0000 or 0001; but since optimization now requires that the result be as large as possible, we take 0001. If we start with 0007, the result is 0003. If we start with 0006, we see that 0002 is too large, since going forward from 0002 gets us to 0007; therefore, going back from 0006 we must take 0001. I.e., in this case, the first part of the table becomes:

Minuend	Result	Subtrahends
0007	0003	54
0006	0001	54
0005	0001	54

where the subtrahends were determined to fit the result to the minuend; the first subtrahend is used if the minuend is even, and the second if it is odd.

Similarly, from the second part of the addend table, we get:

Minuend	Result	Subtrahends
0006	0003	34
0005	0001	34
0004	0001	34

Thus, when the addends for forward processing are 54, the subtrahends for backward processing are also 54; but when the addends are 43, the subtrahends are 34. By considering all cases, it is found that if the larger of the addends is odd, they are used unchanged as subtrahends; if the larger is even, they must be interchanged. For use on an automatic computer, the formula is: If the two addends be called ab, compute the remainder of (a + b + 1)/4. If this remainder is zero, the subtrahends are ba; otherwise, they are ab.

5.1.3.4. An Example of Backward Processing

Consider, now the example given in 5.1.2.4. In the last word, D is fixed. Since the operation is 20, L is measured backward from D, and I is measured forward from D. Assuming throughout that ISOPAR's first choice is available, X = 1545, and the last I = 0003. The five words now read, inserting values already derived:

0047	19	0200	
	45		Y
	46		1545
	20	Tl	1545
1545	20	0100	0003

In word 4, I is now fixed. D is measured backward from I and L is measured backward from D. Deriving optimum values, and inserting them:

0047	19	0200	
	45		Y
	46	1537	1545
1537	20	1542	1545
1545	20	0100	0003

Both D and I of word 3 are now fixed. By the last rule of 5.1.3.1, we find that L measured from D would be 1534, and measured from I it would be 1541. Using the lesser value we now have:

0047	19	0200	
	45	1534	Y
1534	46	1537	1545
1537	20	1542	1545
1545	20	0100	0003

Finally, word 2 is a branch operation with D fixed. Measure L backward from D, and I forward from L:

0047	19	0200	1531
1531	45	1534	0035
1534	46	1537	1545
1537	20	1542	1545
1545	20	0100	0003

5.2. Memory Allocation

The one per card listing of the ISOPAR code shows, near the beginning, the locations of various blocks of memory assigned to particular purposes. Some of these are discussed in the following sections.

5.2.1. Input Region

The following list shows the read-in schedule. The absolute addresses are 0151-0160. Words 1-3 are alphabetic; the others are not. When a card column is shown as 0, it means that a zero is emitted into that position of the word.

Recional

Address	Card Columns, and Explanation
R0001	18-22. L, alphabetic.
R0002	26-30. D, alphabetic.
R0003	32-36 I, alphabetic.
R0004	Emitted 00000 00008 if X-17 (negative word). Emitted 00000 00000 otherwise.
R0005	0 31 0 0 24 25 37 0 0 0. Indexing tags, and operation. If 31 or 37 is blank, it is replaced by an emitted 0.
R0006	Unused.
R0007	0 0 0 0 0 19 20 21 22. L, numeric, often invalid.
R0008	0 0 0 0 0 0 27 28 29 30. D, numeric, often invalid.
R0009	0 0 0 0 0 0 33 34 35 36. I, numeric, often invalid.
R0010	0 0 0 0 0 0 0, followed by the 2-digit card type.

Shortly after the card is read, control goes to ROO10, whereupon the card type becomes the entry to a particular segment of the routine. The 533 control panel determines this type as follows: If column 17 contains a 1 or 2, that digit preceded by 0 is the card type. If 17 lacks 1 and 2, but 23 is punched, then the digit punches (1-9) of 23 and 25 are the card type. If neither of these conditions exists, then 08 is used. The full list of card types is as follows:

- Ol lin c.c. 17; i.e., comments card.
- 02 2 in c.c. 17; i.e., relocatable subroutine.
- 08 Ordinary card of the code.
- 16 ALF, Alphabetic word.
- 21 BIA, Block availability.
- 25 SYN, Synonym.
- 27 BOP, Beginning of program.
- 29 BIR, Block reservation.
- 54 EQU, Equality.
- 73 PAT, Punch availability table.
- 84 HED, Symbol-table clearer.
- 93 REL, Relocation indicator.
- 94 RBD, Reserve band.
- 97 REG, Regional designator.
- 98 REQ, Relocatable equivalence.
- 99 RBR, Relocatable block reservation.

5.2.2. Output Region

For most output cards, the output region is used as follows:

P0001-4 Not used for punching.
P0005 Card number. Punches into 77-80.
P0006 Location of the assembled instruction. Punches into 1-4.
P0007 OP, in positions 5-6. Punches into 5-6.
P0008 D, at right end of word. Punches into 7-10.
P0009 I, at right end of word. Punches into 11-14.
P0010 Control information, as follows:

Position 1: A card that is not part of the code; i.e., type 1, or a pseudo-operation other than ALF. Causes 0000 01 0000 0000 to punch into 1-14, with an X in 9.

Position 3: Causes a 3 to punch in column 76. (See 3.1.5.)

Position 5: Activates Punch B. (See below)

Position 7: Causes it to omit punching L, and to punch 7 in 76.

Position 8: Causes it to omit punching D, and to punch 8 in 76.

Position 9: Causes it to omit punching I, and to punch 9 in 76.

Position 10: Word is negative. Causes X to overpunch in 14.

All of the cards have a control X punched in 15.

When an ALF card is processed, words 7,8,9 may hold other digits in addition to those described above, but they are not punched and do not affect the result in any other way.

When Punch B is activated (8 in position 5 of word 10), the availability table (2.3.7) is punched. Ten columns are punched, respectively, from each of words 1,2,3,4,9,6,7,8. (Word 5 is not used, to make it possible to carry the card number through such a punch-out.)

5.2.3. Availability Table

The availability table "remembers" drum locations used by the program which is being assembled, and those still available for use. The table contains 200 words, or 2000 digits; each digit shows the status of one memory word: 0 = unavailable; l = available. The 10 digits of the first word of the table show the status of, respectively, 0000, 0050, 0100,...,0450. The second word shows the status of 0500, 0550,... 0950. The fifth word of the table shows the status of 0001, 0051, 0101...,0451, etc. With this arrangement, when we have determined the dynamic level which ought to be used for a blank address or a new symbol, we can tell whether any such address is available by zero-testing four words. If those four words are all zeros, we continue in the proper direction and use the nearest word that is available. In any case, when a non-zero availability word is found, the first non-zero digit of the word is used.

Suppose we need a location of dynamic level 12. If we are processing forward, the choice goes, in sequence, 0012, 0062, 0112,... 1962,0013, 0063,... 1963, 0014, etc. But if we are processing backward, the sequence of choice is more complicated: 1512, 1562,...1912, 1962,1012,1062,...1462,0512,0562,...,0962,0012,0062,...,0462,1511, 1561,...,1961,1061,etc. It is often possible to tell just by glancing at an address whether it was derived during backward or forward processing.

5.2.4. Storage Region

When a card is stored during the forward search, five of the input words are stored for later reference. Words ROOOl through ROOO5 (described in 5.2.1) for the card which initiated the search are stored in SOOOl-SOOO5; the same words for the next card are stored in SOOO6-SOOlO; etc. Words ROOO6-ROOlO need not be stored, because they are not used in processing a type O8 card, which is the only type that is stored up.

If the search ends with transfer to the QUITT routine, S0001-S0005 are brought back to R0001-R0005, and processed. Then each other card is brought in turn to the same place. When the card which initiated QUITT is reached, its words R0006-R0010 are still in place, never having been disturbed.

If the search ends with the BACKW routine, the last card stored is taken to RO001-R0005 for processing backwards; its assembled word is in P0006-P0010 as usual, but these words are then stored at the end of the storage region. Each card is processed in turn going backwards, and stored in the storage region; when all have been processed, they are brought back in turn to P0006-P0010, and the cards are punched at top punching speed.

5.2.5. Symbol Table

When a numerical address has been assigned to a symbol, the 10-digit representation of the symbol is stored in the symbol table. Symbols in which the last character is non-blank are stored as encountered, starting with the beginning of the table. Symbols in which the last character is blank are stored as encountered, starting with the end of the table. These latter are cleared from the table whenever there is a pseudo-operation HED. Care is taken that the two series of symbols do not overlap. The symbol table is cleared during initialization.

5.2.6. Equivalence Table

Whenever a symbol is stored in the symbol table, its numerical equivalent is stored in the equivalence table. The equivalent of the first symbol in the symbol table is stored in the D-position of the first word of the equivalence table; the equivalent of the second symbol goes into the I-position of the same word. The equivalents of the next two symbols are similarly stored in the second equivalence word.

The equivalence table need not be cleared initially or by a HED card, because it is never consulted except to store or find the equivalent of a symbol that is in the symbol table. Storing is done in such a way that only the four digits are disturbed, leaving the rest of the digits and the sign unchanged. The values are used in such a way that the other digits and the sign do not affect what we take from the table.

5.2.7. Optimizing Addends and Tags

Information needed to optimize the instructions is stored in 0800-0899. For example, the information for operation 17 is in location 0817. The digits of one of these words have the following meanings:

- 1: Optimum dynamic level of D minus given level of L, when L is even.
- 2: Same, when L is odd.
- 3-4: Optimum dynamic level of I, measured from given level of L or of D according to the operation, when latter is even.
- 5-6: Same, when reference address is odd.
- 7: 8 for an operation whose execution requires a variable length of time (MDF operation).

9 for an operation requiring a fixed length of time.

8-9: 88, operation 31.

98, other shift operations; namely, 30, 35, 36.

89, indexing operations; namely, 50-53, 58-59, 80-83, 88-89.

99, any other operation.

10: 8 if I is measured from L (e.g., branch, shift, indexing).
9 if I is measured from D (e.g., add, subtract, store).

The following represent slight modifications in the above:

(a) When digit 1 is zero, D is not an address; it may have other meaning, as in shift operations; or it may be meaningless, as in operations 00.01.

tions 00,01.
(b) For shift operations, where the optimizing addends come from analysis of D, the first 6 digits of 0830 etc. are zero. The optimizing

addends are given in 1250-1259.

(c) For indexing operations, D is not a drum address. For these operations, digits 5-6 are zeros, but digits 1-4 have a special meaning. They have the values 0101 for operations 80,82,88, and 0000 for the other indexing operations.

(d) For an MDF operation, optimizing addends cannot be given reliably; but digits 1-6 are the quantities that are used in case the

forward search ends in QUITT.

5.2.8. Region Table

Locations G0001-G0029 (excepting G0010, G0020, G0021) are used for interpreting regional addresses. Suppose an REG card shows X1369, meaning that thereafter regional address X0001 = 1369. The numerical equivalent of X is 87, and 87-60=27. The number 1369 is then stored in G0027.

The region table is cleared during initialization; a non-zero in any cell of the table shows that there has been an REG card for that region. It will be noted that a card such as REG X0000 is invalid, since it would be impossible to tell that there had been an REG card for that region.

G0012 and G0020 are assigned by SYN cards to particular temporaries. G0021 is used as a zero constant.

5.3. Description of the Program

The main routine is quite short — in fact, it may be said to consist of only 4 words. From the last of these, it branches to any of 16 different exits, namely the card types given in 5.2.1.

On a card type Ol, the branch is directly to Subroutine 10. On type O2 or a pseudo-operation, the branch is to a short segment of routine which appears near the end of the list.

On an ordinary card (type 08), the branch is to the segment which immediately follows the main routine. Thence, in turn, the code may branch to any of several subroutines, or to the forward search. The latter uses various subroutines, and eventually goes to either the QUITT routine or to the backward processing (BACKW) routine. It will be noted that under one set of circumstances it goes to BACKW and almost immediately resumes the forward search. This is the case where the search starts with an MDF operation, but I of that word is fixed.

There are three entries to the forward search, because it is necessary to make note of the reason for the search. The third entry is from Subroutine 19.

5.3.1. Right-Justified Temporaries

A number of quantities are stored in temporaries with absolute addresses, or with 5-letter symbolic addresses, because they are used in various parts of the program. Most of these will now be briefly described; for some, the derivation of the 5-letter symbol will be indicated.

ALOPT (all optimizing tags) is developed in Subroutine 14, and is sometimes modified elsewhere. It is developed for each word that is processed. Its digits have the following significance:

- 1: 9, Subroutine ll is to reserve any location which it selects. This is the initial and usual value for this digit.
 - 8, Subroutine 11 is not to reserve any location. This value is used when both D and I are fixed during backward processing of a branch instruction. (5.1.3.1.)
- 2: 8 is initial value. Changed to 9 during backward processing, if it is found that D is not a fixed address. (5.1.3.2.)
- 3: Same, for I.
- 4-5: Unused.
- 6: 8, the operation is one for which D is not an address, or at least not a drum address. (E.g., 30, 80.)
 - 9, the operation is one for which D is an address. (E.g., 10, 69.)

The determination is made on the basis of whether the first digit of OPTIM is zero.

7-10: Identical with digits 7-10 of OPTIM.

BLANB holds the equivalent found for a $\underline{\text{blan}}$ k L during $\underline{\text{backward}}$ processing.

BLANK holds the equivalent of a blank D or I during forward processing. $\ ^{\circ}$

CDIFF holds the amount by which an REL card says to relocate core addresses.

COUNT shows the number of addresses in an instruction which are tagged for indexing. It is either 0, 1, or 2.

DDIFF holds the amount by which an REL card says to relocate a drum address.

DRUMT is initially 80 0000 0000. It is changed to 90 0000 0000 if the availability table shows that there is no space on the drum to which a blank or symbolic address can be assigned. It is changed to 80 0000 0000 during processing of a BLA card.

EQUIV holds, at its right end, the absolute equivalent of any address that has been processed, as soon as the equivalent has been determined.

HSYMB holds the alphabetic address that is being worked on, excepting that if the address is blank, it is not stored in HSYMB. (The symbol was carried over from SOAP II, where it stood for "headed symbol.")

LSYMB (location of symbol) shows either (1) the location in the symbol table where the symbol given in HSYMB may be found, or (2) an unused location, into which that symbol may be stored. LSYMB is in the D-position of the word.

OPTIM shows the word taken from 0800-0899 (see 5.2.7) that is appropriate to the operation involved in the card now being worked on.

OPREG (operating register) shows the dynamic level of an address which we have just finished using. If it is a drum address, the address itself (perhaps indexed) is put into OPREG, except sometimes for the addition of COUNT on an L-address. If it is a core address or an 800X D address, the dynamic level (never less than -0001 nor more than +0050) is computed and stored in OPREG.

ORCEB, ORCEQ, and SAVOR are used for storing various quantities used in attempting to optimize through core addresses. A core address itself is always optimized.

SAVEL and SAVED are used for saving addresses already derived for L and D, respectively, at the start of a forward search.

1030 and 1050 hold various distributor-branch tags, used to select different cases. The determination of the proper circumstances for changing these tags proved one of the most troublesome features of writing ISOPAR.

1030 holds the QUITT tag. Digit 1 is set to 8 when processing a card of type 08 (ordinary). It is changed to 9 at start of a forward search. It is used in Subroutine 19: A new-symbol L, when processing forward, starts a forward search if this digit is 8; but not if it is 9, for then we are on QUITT routine, and a search has been proven fruitless.

1030 holds other tags, in digits 5 and 6, which are used to tell the circumstances which started the forward search, and which are used at various places in the processing.

1050 holds the First-Card Tag. Its first digit is set to 8 when a card of the main routine is read. It is changed to 9 at the end of the study of a card during the forward search; so if the first card searched initiates QUITT or BACKW, the tag is still 8. During QUITT, it is changed to 8 at the end of the first card; hence, during QUITT, it is 9 for the first stored card if there are more than one; it is 3 in other cases. On BACKW, if there is more than one stored card, 1050 is changed to 8 when a blank L is processed backwards, whereafter it is used to indicate that blank D or I is to be made equal to BLANB. On BACKW with only one stored card, 1050 starts with 8, but changes to 9 if it is determined that the forward search started with L, so that this one card can be processed on the same basis as the first backward card in the more general case.

5.3.2. Subroutines

In addition to the 16 segments of code entered from the 16 different card types, there are 19 subroutines. Although many of these are usually entered from card type 08, some of them can be reached from other portions of the code. The subroutines are numbered 1 through 22, omitting 12, 15, and 16. The salient facts about each subroutine will now be listed, including a statement as to whence it is entered.

The symbolic entry word to a subroutine is of the form SUBRI, SUB19, SB10A, SUB2R, etc., excepting for subroutine 18, the entry word to which is INDEX. At the time of entry, the exit word is in the Distributor unless otherwise noted. Normally, this is stored soon after the subroutine is entered. To conserve drum space, the exits are stored in only three different locations, called EXITX, EXITY, and EXITZ, and these are put into otherwise unused locations of the punch region.

- l: Initialize the drum at the start of a program. This is entered either from the first word of the main routine, or from BOP. It clears the region and symbol tables; clears card number; sets DRUMT to 80 0000 0000; and makes the availability table all 1's, since the entire drum is initially available.
- 2: Double-entry. If entered at SUB2R, it reserves all locations from FWA to FWA+N, inclusive. If entered at SUB2U, it unreserves similarly. At time of entry, FWA is in Upper, and N is in

Lower. Before reserving is attempted, checks are made so that no reservation will be attempted beyond location 1999. It is entered from Subroutines 4, 8, and 19, and from BLR, BLA, EQU. (Reserving of optimally assigned locations is done by Subroutine 11, without use of Subroutine 2.)

3 is used during the forward search to determine whether an address is fixed. At entry, the address in question, alphabetic, is in upper. At time of exit, type of address is indicated by contents of accumulator, as follows:

Blank, new symbol, core: 00000 00000 00000 00008

Drum, regional, old symbol: 00000 00000 00000 00000

800X: 00000 00000 0800X 00000

Absolute, not in those ranges; undefined symbol with table full; regional with region undefined:

00000 00008 00000 00000

- 4, 5, 6: Used to process L, D, or I, respectively, backwards. This is done principally by appropriate use of other subroutines.
- 7: This stores a new symbol in the symbol table, and its absolute equivalent in the equivalence table. Makes use of the contents of EQUIV, HSYMB, and LSYMB, which were stored by Subroutines 11, 9, and 9, respectively. Entered from Subroutines 4,5,6,19, 20,21.
- 8: This is used to process addresses in type 2 cards (relocatable subroutines). At entry time, the Upper contains the alphabetic address, used only to determine whether the address is to be fixed; the Lower contains the numeric address. At exit, the relocated address is in the Lower; or, if the relocation gives too high a value, the Upper will contain 00 0000 8000.
- 9: This subroutine, which may be entered from Backward Processing or from Subroutines 3, 4, 5, 6, 19, 20, or 21, examines an address to determine its character. At entry, the alphabetic address is in the Upper. Although the basic exit instruction is, as usual, in the Distributor at time of entry, it may be modified by the subroutine according to the type of address. If the I-position at time of entry shows K, the I-position of the actual exit instruction is as follows:

K-2: Address is regional with region undefined; or is a new symbol but symbol table is full.

K-1: Address is blank.

K: Absolute drum address; or symbolic or regional address equivalent to a drum address.

K+1: Undefined symbol, but there is room for it in symbol table.

K+2: 800X address.

K+3: Core address; i.e., absolute, in range 9000-9059.

K+4: Some other absolute address (or possibly a symbolic or regional address equivalent to an "other" address).

Normally, part of a constant.

Subroutine 9 also stores the following:

HSYMB: The alphabetical symbol, unless it is a blank.

EQUIV: The absolute equivalent of the address, in cases K, K+2, K+3, and K+4. (Should an undefined symbol happen to consist of four digits preceded by a digit or a special character, the four digits will be stored in EQUIV, but will not be used.)

LSYMB: If the address is an old symbol, D-position of LSYMB receives the location of the symbol in the symbol table, less the location of the first word of that table. Similarly, if the address is a new symbol, LSYMB receives the location into which the symbol ought to be stored.

- 10: This so-called subroutine is a collection of short bits of code, namely the common endings of various subroutines and segments.
- 11: This subroutine is used for finding the optimum address, when the given address is blank or is a new symbol. It uses Subroutine 13 to find the optimum dynamic level; then ll examines the availability table to find the available location which most nearly fits the prescribed level. The selected location is stored in EQUIV, and also is in the Lower at time of exit. The location is reserved, except when the first digit of ALOPT is 8. (See 5.3.1.)

Subroutine 11 is entered from Subroutines 4,5,6,19,20,21. At entry time, the exit instruction is in the Lower, and includes various branch-distributor tags. If the Lower is of the form 00 Oabc KKKK, abc shows where we came from, as follows:

From Subroutine 4 (backward L): 989
From Subroutine 5 (backward D): 988
From Subroutine 6 (backward I): 990
From Subroutine 19 (forward L): 890
From Subroutine 20 (forward D): 888
From Subroutine 21 (forward I): 889

Should the drum be packed, so that no location is available, the exit instruction is changed from 00 Oabc KKKK to 00 Oabc KKKK+1. Also the drum tag is changed from 80 0000 0000 to 90 0000 0000, so that it will thereafter be unnecessary to go through a search of the availability table.

13: This subroutine is usually entered from Subroutine 11, but possibly from 4, 5, 20, or 21. The data it uses are found in OPREG, OPTIM, and ALOPT, described in 5.3.1. At entry time, the Distributor contains 00 Oaxc KKKK, where x is irrelevant, KKKK is the location of the next instruction, and ac have the values given under Subroutine 11.

At the end, the computed optimum dynamic level is shown at the right end of the Accumulator, with a value between 00 and +49, inclusive.

To explain the classification of cases within the subroutine, note that we never get to 13 when processing the D address of an indexing or shift operation, or when processing backward D of a branch operation.

- 14: This is entered from many different places and is used before much else can be done with a word. It transfers the control information and the operation to the output region, and separates the indexing tags and counts them (See COUNT, 5.3.1.). It moves the optimizing addends and tags from 0800-0899 to OPTIM, and develops the initial form of ALOPT. At exit time, ALOPT remains in the Distributor.
- 17: This subroutine is entered from 5 or 20. At entry, the Lower still contains P, the optimum dynamic level determined by Subroutine 13. 17 computes a slight correction to the dynamic level of D in certain cases: If D is 8002 and P is odd, or if D is 8003 and P is even, the correction is +1; if D is 8001, the correction is -1. This amount will later be added to P in Subroutine 20, or subtracted from P in 5.
- 18: This modifies a drum or core address if the address was tagged for indexing. At entry, the Lower contains the absolute value of the address to be indexed, in the I position. The D position of the Distributor is O if a D-address is being indexed, and I if an I-address is being indexed.
- 19, 20, 21: Used to process L, D, or I, respectively, forward.
- 22: This is a short subroutine used to preserve ORCEQ at the start of backward processing, for possible use when we go forward again. At time of entry, exit word is in Lower instead of Distributor.

6. Desirable Changes in ISOPAR

ISOPAR was prepared in the Spring of 1958, and has been in constant use since that Fall. It was probably effectively debugged for the features which exist on the 650 used by the National Bureau of Standards. On the other hand, it has never assembled a complete program for a 650 equipped with core, tapes, or disks. (If features involving operations 25-29 are used, the 407 plugboard should be slightly modified.)

Some work has been done toward incorporating certain desirable revisions. However, the National Bureau of Standards will soon stop using the 650, and since the existing ISOPAR represents considerable improvement over SOAP, it seems best to publish ISOPAR now, and indicate possible further improvements.

In preparation for publication, a few minor improvements were made. Most of the changes suggested in the following sections would involve major modifications of the code.

6.1. Changes to Improve Optimization

- (a) If the forward search ends with the fixed D address of an MDF operation, it processes backward from that fixed address, but then does not start another forward search; instead, it uses the normal processing procedure from that fixed D. This defect was discovered in debugging the code, but it would require very extensive modification to remedy, and it has not been corrected.
- (b) An indexed D with an operation such as 80 should not initiate a forward search, since there is no uncertainty as to the length of time required to perform the operation.
- (c) For the same reason, an indexed D with operation 80, encountered during the forward search, should not initiate QUITT, but the search should continue.
- (d) When operation 69 has blank D (the usual entrance to a subroutine), the L of the following instruction is correctly made equal to that D; but then a forward search ought to be initiated, since the latter instruction is not performed in the place indicated by its L. This would probably be a major revision: At present, a forward search always starts with either L or I, but this would require one to start with D.
- (e) A forward search is terminated by QUITT when the search reaches any type of card other than type 08 (ordinary card); and even by a type 08 card if it is a constant. Present programming custom

often puts together at the end of one segment and the start of another the following cards: Card with blank I, constants, type Ol card, HED card, card with blank L. It would be desirable to carry the search through this group, and optimize backward through them. This would require a substantial increase in the capabilities for storing cards and for processing stored cards.

(f) In ISOPAR, the optimization through core addresses is not very good. In this it resembles SOAP II, although the methods are different. Suppose, for example, that during normal processing the following pair of instructions is reached:

1000 60 1003 9002 9003 15 ABC

Both assembly routines derive 07 as the dynamic level of 9002, and then use 07 as the dynamic level of 9003 in optimizing ABC. Other cases involve more complicated rules; but essentially they all assume that some nearby core addresses are the same.

Perhaps optimization could be improved by making a record of the dynamic level last assigned to each core address, for use when that address shows up again as L. Or if, as above, a core L is not equal to the preceding I (or D in case of a branch order), a forward search might be initiated on the grounds that we probably have the start of a loop. Such changes would substantially increase the length of the code.

(g) In deciding whether to terminate a forward search, ISOPAR erroneously treats an indexed D as fixed, and initiates backward processing. It would probably be more logical to initiate QUITT although it would apparently make little actual difference in the result.

6.2. Changes to Improve Usability

Although the method of transferring the input symbolic code to the output cards through a Reproducer has been reasonably satisfactory, it is of course more troublesome than if the 533 would punch the entire information. This is impossible (1.3.1), but one of the changes which has been considered is to have columns 17-37 transferred to the output through the 533, so that the symbolic and assembled codes could be listed together for immediate check-out without waiting for reproducing Normally, the remarks would be reproduced at a later time, unless the immediate check-out uncovered errors which warranted discarding the output code at this stage.

6.3. Changes to Speed Assembly And/Or Make More Drum Space Available

Most of the changes suggested in 6.1 and 6.2 require more drum space. There are several ways in which more space can be made available.

- (a) ISOPAR uses 1900-1999 only during the read-in. Those cells are also used for tracing routines to hunt errors in ISOPAR, and for a punch-out routine to punch the code at the rate of 7 words per card. Those locations could not be used for instructions, but they could be used for part of the symbol table after the need for tracing is past.
- (b) The sizes of the symbol table and of the storage region are flexible, and after any other changes they should be modified to fill the drum. If any change is made in the size or location of the storage region, note the following precautions, unless other revisions make them obsolete: The length of the storage region is a multiple of 5. The SYN cards for SMAXM and SMAXI must be corrected.

If a change is made in the size or location of the symbol table, note the following: The equivalence table is exactly half as long as the symbol table. The region table should immediately precede the symbol table, so that both can be cleared with one set-up, in Subroutine 1. Somewhere in the drum, there must be a zero word preceding the symbol table, and one following it; at present, these are in GOO21 and ZMAX1. The SYN cards for ZMAXM and ZMAX1 must be kept up to date. The constant ZTABL, which shows the length of the symbol table and appears at the end of the program, must be correct. The SYN card for HSYMB is used only to improve optimization, and only the dynamic level is significant; its dynamic level is at present 4 higher than that of ZMAXM.

- (c) ISOPAR follows SOAP II in providing that the assembly routine uses only the basic 650 plus alphabetic feature; but that it will assemble programs involving other optional features. It would be better to prepare two different versions: Version A, which will assemble programs involving all optional features, but which uses index registers in the assembly; Version B, which omits all reference to index registers. Both of these would be considerably shorter than the present version; in fact, Version A would be several hundred words shorter. It seems very unlikely that a 650 without index registers would have to assemble a program that used them; if that should happen, the present version of ISOPAR could be used for the purpose.
- (d) Another way of getting additional drum space (not over 60 locations) would be to provide that the instructions for handling core addresses be in locations 9000-9059, or as many of them as would be useful. This would not require separate codes for machines lacking

core memory, except for omitting the reading of the instructions that go into core; but it would mean that ISOPAR could process programs involving core only on a machine equipped with core memory.

															0051					
PAGE	COMMENTS *			of a loop		fixed D						right-justified symbolic I	olank character		reserved, but not 1000 nor 0	X	ve 0177	ve 0101-0110	index register A)	
R PROGRAM SHEET	REMARKS, OR END	constant, namely 6	comparison constant, to test for end	heading (comment) card	Card of a relocatable subroutine, with	negative constant, namely -300	To reserve 0306	To reserve 1296-1305, inclusive	To reserve 3330-3349	To reserve 0000 and 0600-1899	Blank L, left-justified symbolic D, ri	Letter O, letter I, digit O, dijt l,	Absolute address	Constant, namely 1013000051. 0350 is	Store from Lower into word 2 of Region	Designate that POOO1 = 0177, and reserve	Designate that ROOO1 = 0101, and reserve	Store Lower into (POOOO + contents of		
ΡA	-4	37	स	h	V	t)	Ą	Ē	Ţ	T	Ţ	m	H	A	Ö	S	Ā	Ū	S	 I
650 ISOPAR	I ADDR	32-36	9000	XXX		2000	0300		1305		1899	AB			005/			0110		
65	-4	31			•														A	
	POP D ADDR	26-30	0000	END	CARD	F 0002	0000	0306	1296	0000	0090	×	\$16AC	0130	1000	X 0002	P 0177	R 0101	P 0000	
	ЭС	3455	00	20	NTS	30	00	BLR	BLR	BP	RBD	60	24	21	9	20	REG	REG	20	
	D S	Ŕ			×			B	B	R	X						R	N/		1
	707	18-22 222425	0910	94	COMME	0050	0910						ΙO		0350					
	Η	17			/	2	1													
		91	K	Ø			X								\times					

FIGURE 1. Samples of ISOPAR input program cards *On type I card, comments start in column 18.

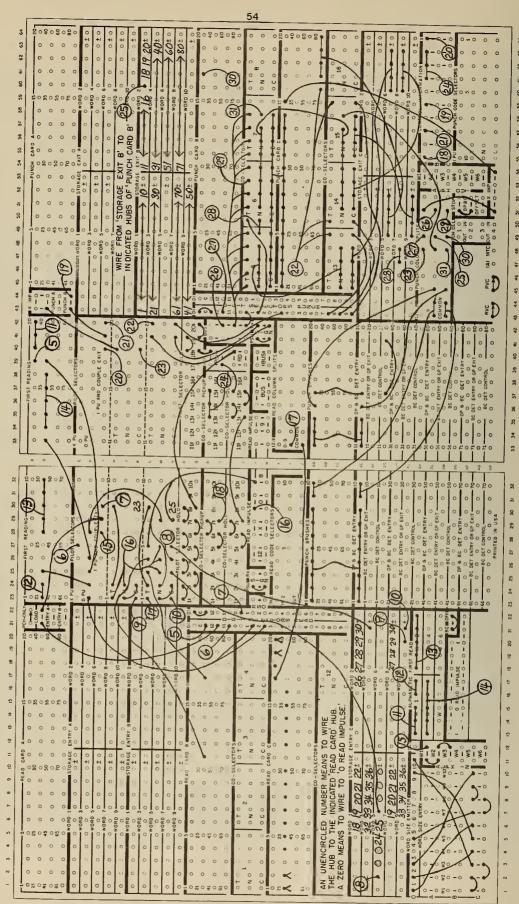
-
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SOPAR
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650
2
10
W

REMARKS, OR END COMMENTS *	38—75	FJ002 denotes second word of region F	FOOO2 denotes that region F starts in location 0002	denotes that 0002 is not to be mpdified in relocation	-2 addresses are relocated: Drum by 1200 and core by 0010	-2 addresses are relocated: Drum probanged and core by 0020	ol SINEX = (3000 + amount of relocation shown by last REL card)	Reserve 0000-0051 augmented by amount shown on last REL card	Reserve 0013 and put 00 61 87 00 00 into it	Put positive zero into symbolic location PC	Reserve 0014 and put negative zero into it	1699 available	0159-0183 available	Clear from symbol table all symbols which are not right-justified	Make right-justified symbolic $X = 0100$, and reserve 0100	symbol ALPHA equal to value of symbol BETA, and reserve	assemble a second input program without rereading ISOPAR	Punch availability table. Normally, uped only at end of program	card with 800X in L can be used but as not useful
		F00()OC:	F0002	Type-2	Type-2	Symbol	Res	ភូមន	Put	Res	Make	Make	cle	Mak	Vake	To	um.	υ </td
-4	37			,															
ADDR	32-36			7000	0/00	0020	0000	0051					6810		0010	BETA			
-4	3																		
D ADDR	26-30 31	F0002	F0002	F0002	1200		SINEX	0000	bAX			1699	0169		×	ALPHA			0010
90 80	232425	20	REG	30	REL	7 =	REQ	RBR	ALF	ALF	LF	-A	B4 A	Z=	X	BU	BOF	AT	3
0.0			2		RL	RE	RL	2		A	T	189	8	HE	S	7	B	B	
707	18-22								0013	PR	4/00								8003
⊢ □	11			2							1								
	91													_					

FIGURE 2. Samples of ISOPAR input program cards *On type I card, comments start in column 18.

IBM 650 DATA PROCESSING SYSTEM IBM 533-537 CARD READ PUNCH, CONTROL PANEL DIAGRAM

INTERNATIONAL BUSINESS MACHINES CORPORATION



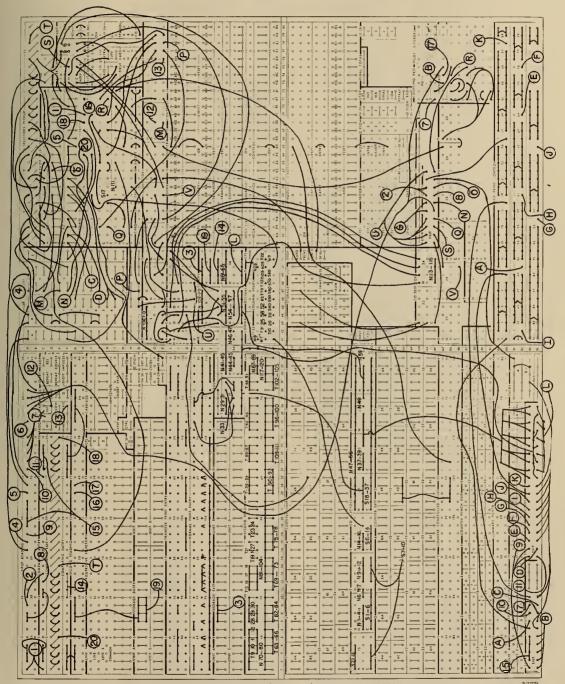
533 ISOPAR CONTROL PANEL TYPE FIG.

63

29

57

- S: WIRE TO INDICATED SECOND READING HUB
- N: WIRE TO INDICATED NORMAL PRINT ENTRY HUB
- T: WIRE TO INDICATED TRANSFER PRINT ENTRY HUB



ROUTINE FOR THE IBM 650 DATA PROCESSING SYSTEM

			8
RBD 1150		RESERVE PART OF REGION S	10
RBO 1350	1999		12
BLR 0002		TYPE 2 ROUTINE	14
BLR 0008		ORDINARY CARD	16
BLR 0010		MANUAL PAT	18
BLR 0016		ALF ROUTINE	20
BLR 0021		BLA ROUTINE	22
BLR 0025		SYN ROUTINE	24
BLR 0027		BOP ROUTINE	26
BLR 0029		BLR ROUTINE	28
BLR 0054		EQU ROUTINE	30
BLR 0073		PAT ROUTINE	32
BLR 0084		HEO ROUTINE	34
BLR 0093		REL AND RBD ROUTINE	36
BLR 0097	0099	REG, REQ, RBR ROUTINES	38
REG Q0118	0131	BRANCH ENTRIES IN EQU. SYN. AND REQ	40
REG R0151	0160	READ REGION	42
REG T0168	0172	ENTRIES IN PAT	44
REG P0177	0186	PUNCH REGION	46
REG F0218	0224	BRANCH ENTRIES IN SUBROUTINE 3	48
REG M0268	0277	BRANCH ENTRIES IN SUBROUTINE 4	50
REG J0368	0375	BRANCH ENTRIES IN SUBROUTINE 6	52
REG L0418	0425	BRANCH ENTRIES IN SUBROUTINE 19	54
REG 00469	0478	BRANCH ENTRIES IN SUBROUTINE 20	56
REG X0518	0531	BRANCH ENTRIES IN BACKWARD PROCESSING	58
REG 10572	0581	BRANCH ENTRIES IN SUBROUTINE 21	60
REG U0608	0609	USEO IN HEO ROUTINE	62
BLR 0900		CERTAIN TEMPORARIES	64
REG C0918	0927	BRANCH ENTRIES IN SUBROUTINE 5	66
BLR 1030		SEARCH-START TAG	68
BLR 1050		FIRST-CARD TAG	70
REG 51125	1149	STORAGE REGION: 1125-1199	72
BLA 1350	1354	RESERVEO BY RBD. BUT NOT NEEDED	74
REG A1355		AVAILABILITY TABLE: 1355-1554	76
REG E1555		EQUIVALENCE TABLE: 1555-1659	78
REG G1660		LIST OF REGIONS+ 1660-1688	80
REG Z1689		SYMBOL TABLE, 1689-1898	82
SYN SETCC	0001	TYPE 1	84
SYN HSYMB	0108	OPTIMIZE MAIN ITERATION OF SUBR 9	86
SYN EXITX	P0001	TO CONSERVE DRUM SPACE	88
SYN EXITY	P0002	TO CONSERVE ORUM SPACE	90
SYN EXITZ	P0003	TO CONSERVE DRUM SPACE	92
SYN DRUMT	G0010	TO CONSERVE ORUM SPACE	94
SYN BLANB	G0020	TO COMSERVE ORUM SPACE	96
SYN ZEROX	G0021	OOUBLE USE OF ZERO	98
SYN SMAXM	1199	LAST CELL OF STORAGE AREA	100
SYN SMAX1	1200	CELL BEYONO END OF STORAGE AREA	102
SYN ZMAXM	1898		104
SYN ZMAX1	1899	FOR CLEARING CELL BEYOND Z REGION	106

			OPTIM	IZING AOOE	NOS AND TAGS	108
0800 00 0404 9998	к 08	09 00	0404	9998	FOR OPERATION = LOCATION - 0800	110
0801 00 0404 9998	K 08	01 00	0404	9998	FOR OPERATION = LOCATION - 0800	112
0802 33 2322 8999	K 08	02 33	2322	8999	FOR OPERATION = LOCATION - 0800	114
0803 00 0505 8998	K 08	03 00	0505	8998	FOR OPERATION = LOCATION - 0800	116
0804 00 0505 8998	K 08	04 00	0505	8998	FOR OPERATION = LOCATION - 0800	118
0805 00 0505 8998	K 08	05 00	0505	8998	FOR OPERATION = LOCATION - 0800	120
0806 00 0505 8998	K 08	06 00	0505	8998	FOR OPERATION = LOCATION - 0800	122
0807 00 0505 8998	K 08	07 00	0505	8998	FOR OPERATION = LOCATION - 0800	124
0808 33 1212 9999	K 08	08 33	1212	9999	FOR OPERATION = LOCATION - 0800	126
0809 33 0202 9999	K 08	109 33	0202	9999	FOR OPERATION = LOCATION - 0800	128
0810 33 0504 9999	K 08	10 33	0504	9999	FOR OPERATION = LOCATION - 0800	130
0811 33 0504 9999	K 08	11 33	0504	9999	FOR OPERATION = LOCATION - 0800	132
0812 99 9999 8999	K 08	12 99	9999	8999	FOR OPERATION = LOCATION - 0800	134
0813 99 9999 8999	K 08	13 99	9999	8999	FOR OPERATION = LOCATION - 0800	136
0814 33 1110 8999	K 08	14 33	1110	8999	FOR OPERATION = LOCATION - 0800	138
0815 33 0504 9999		15 33	0504	9999	FOR OPERATION = LOCATION - 0800	140
0816 33 0504 9999	K 08	16 33	0504	9999	FOR OPERATION = LOCATION - 0800	142
0817 33 0504 9999	K 08	17 33	0504	9999	FOR OPERATION = LOCATION - 0800	144
0818 33 0504 9999	K 08	18 33	0504	9999	FOR OPERATION = LOCATION - 0800	146
0819 33 2120 8999	K 08	19 33	2120	8999	FOR OPERATION = LOCATION - 0800	148
0820 54 0303 9999	K 08	20 54	0303	9999	FOR OPERATION = LOCATION - 0800	150
0821 45 0303 9999	K 08	21 45	0303	9999	FOR OPERATION = LOCATION - 0800	152
0822 34 0303 9999	K 08	22 34	0303	9999	FOR OPERATION = LOCATION - 0800	154
0823 34 0303 9999	K 08	23 34	0303	9999	FOR OPERATION = LOCATION - 0800	156

0824 33 0303 9999 0825 44 0505 9999	K			0000	FOR OPERATION - LOCATION - ORGO	150
0825 44 0505 9999			33 0303	9999	FOR OPERATION = LOCATION - 0800	158
	K		44 0505	9999	FOR OPERATION = LOCATION - 0800	160
0826 00 0505 9998	K		00 0505	9998	FOR OPERATION = LOCATION = 0800	162
0827 00 0505 9998	K		00 0505	9998	FOR OPERATION = LOCATION - 0800	164
0828 33 1212 9999	K	0828	33 1212	9999	FOR OPERATION = LOCATION - 0800	166
0829 33 0202 9999	K	0829	33 0202	9999	FOR OPERATION = LOCATION - 0800	168
0830 00 0000 9988	K	0830	0000	9988	FOR OPERATION = LOCATION - 0800	170
0831 00 0000 9888	K		00 0000	9888	FOR OPERATION = LOCATION - 0800	172
0832 33 2726 8999	ĸ		33 2726	8999	FOR OPERATION = LOCATION - 0800	174
						176
0833 33 2726 8999	K		33 2726	8999	FOR OPERATION = LOCATION - 0800	
0834 33 2726 8999	K	0834	33 2726	8999	FOR OPERATION = LOCATION - 0800	178
0835 00 0000 9988	K	0835	0000	9988	FOR OPERATION = LOCATION - 0800	180
0836 00 0000 9988	K	0836	00 0000	9988	FOR OPERATION = LOCATION - 0800	182
0837 33 2726 8999	K		33 2726	8999	FOR OPERATION = LOCATION - 0800	184
0838 33 2726 8999	ĸ		33 2726	8999	FOR OPERATION = LOCATION - 0800	186
					FOR OPERATION = LOCATION - 0800	188
0839 33 2726 8999	K		33 2726	8999		
0840 33 0404 9998	K		33 0404	9998	FOR OPERATION = LOCATION - 0800	190
0841 33 0404 9998	K	0841	33 0404	9998	FOR OPERATION = LOCATION - 0800	192
0842 33 0404 9998	K	0842	33 0404	9998	FOR OPERATION = LOCATION - 0800	194
0843 33 0404 9998	K	0843	33 0404	9998	FOR OPERATION = LOCATION - 0800	196
0844 34 0405 9998	K		34 0405	9998	FOR OPERATION = LOCATION - 0800	198
0845 43 0504 9998	ř		43 0504	9998	FOR OPERATION = LOCATION - 0800	200
	<u> </u>				FOR OPERATION = LOCATION - 0800	202
0846 33 0404 9998	K		33 0404	9998		
0847 33 0505 9998	K		33 0505	9998	FOR OPERATION = LOCATION - 0800	204
0848 33 0404 9998	K	0848	33 0404	9998	FOR OPERATION = LOCATION - 0800	206
0849 33 0404 9998	K	0849	33 0404	9998	FOR OPERATION = LOCATION - 0800	208
0850 00 0000 9898	K	0850	00 0000	9898	FOR OPERATION = LOCATION - 0800	210
0851 00 0000 9898	K		00 0000	9898	FOR OPERATION = LOCATION - 0800	212
				9898	FOR OPERATION = LOCATION - 0800	214
0852 00 0000 9898	K		00 0000			
0853 00 0000 9898	Ķ		00 0000	9898	FOR OPERATION = LOCATION - 0800	216
0854 44 0505 9999	K		44 0505	9999	FOR OPERATION = LOCATION - 0800	218
0855 00 0505 8998	K	0855	00 0505	8998	FOR OPERATION = LOCATION - 0800	220
0856 00 0505 8998	K	0856	00 0505	8998	FOR OPERATION = LOCATION - 0800	222
0857 00 0505 8998	K		00 0505	8998	FOR OPERATION = LOCATION - 0800	224
0858 00 0000 9898	ĸ		00 0000	9898	FOR OPERATION = LOCATION - 0800	226
					FOR OPERATION = LOCATION - 0800	
0859 00 0000 9898	K		00 0000	9898		228
0860 33 0504 9999			33 0504	9999	FOR OPERATION = LOCATION - 0800	230
0861 33 0504 9999	K	0861	33 0504	9999	FOR OPERATION = LOCATION - 0800	232
0862 99 9999 8999	K	0862	99 9999	8999	FOR OPERATION = LOCATION - 0800	234
0863 99 9999 8999	K		99 9999	8999	FOR OPERATION = LOCATION - 0800	236
0864 33 1110 8999	ĸ		33 1110	8999	FOR OPERATION = LOCATION - 0800	238
0865 33 0504 9999	K		33 0504	9999	FOR OPERATION = LOCATION - 0800	240
0866 33 0504 9999	K		33 0504	9999	FOR OPERATION = LOCATION - 0800	242
0867 33 0504 9999	K		33 0504	9999	FOR OPERATION = LOCATION - 0800	244
0868 33 0504 9999	K	0868	33 0504	9999	FOR OPERATION = LOCATION - 0800	246
0869 33 0303 9999	ĸ	0869	33 0303	9999	FOR OPERATION = LOCATION - 0800	248
0870 00 0504 8999	ĸ		00 0504	8999	FOR OPERATION = LOCATION - 0800	250
				8999	FOR OPERATION = LOCATION - 0800	252
0871 00 0504 8999	K					
0872 00 0504 8999	K		00 0504	8999	FOR OPERATION = LOCATION - 0800	254
0873 00 0504 8999	K	0873	00 0504	8999	FOR OPERATION = LOCATION - 0800	256
0874 00 0504 8999	K	0874	00 0504	8999	FOR OPERATION = LOCATION - 0800	258
0875 00 0504 8999	K		00 0504	8999	FOR OPERATION = LOCATION - 0800	260
0876 00 0504 8999	ĸ					
					FOR OPERATION = LOCATION = 0800	
	9		00 0504	8999	FOR OPERATION = LOCATION = 0800	262
0877 00 0504 8999	Ķ	0877	00 0504 00 0504	8999 8999	FOR OPERATION = LOCATION - 0800	264
0878 00 0504 8999	K K	0877 0878	00 0504 00 0504 00 0504	8999 8999 8999	FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 0800	264 266
	K K K	0877 0878	00 0504 00 0504	8999 8999 8999 9999	FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 0800	264
0878 00 0504 8999	K K	0877 0878 0879	00 0504 00 0504 00 0504	8999 8999 8999	FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 0800	264 266
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898	K K	0877 0878 0879 0880	00 0504 00 0504 00 0504 00 0505 01 0100	8999 8999 8999 9999 9898	FOR OPERATION = LOCATION - 0800	264 266 268 270
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898	K K	0877 0878 0879 0880 0881	00 0504 00 0504 00 0504 00 0505 01 0100 00 0000	8999 8999 8999 9999 9898 9898	FOR OPERATION = LOCATION - 0800	264 266 268 270 272
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898	K K	0877 0878 0879 0880 0881 0882	00 0504 00 0504 00 0504 00 0505 01 0100 00 0000 01 0100	8999 8999 8999 9999 9898 9898 9898	FOR OPERATION = LOCATION - 0800	264 266 268 270 272 274
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898	K K K K K	0877 0878 0879 0880 0881 0882 0883	00 0504 00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000	8999 8999 8999 9999 9898 9898 9898	FOR OPERATION = LOCATION - 0800	264 266 268 270 272 274 276
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0883 30 0000 9898	K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884	00 0504 00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526	8999 8999 8999 9999 9898 9898 9898 989	FOR OPERATION = LOCATION - 0800	264 266 268 270 272 274 276 278
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0883 30 2526 8999 0885 00 0606 8998	K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884	00 0504 00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606	8999 8999 8999 9999 9898 9898 9898 989	FOR OPERATION = LOCATION - 0800	264 266 268 270 272 274 276 278 280
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0884 33 2526 8999 0885 00 0606 8998 0886 00 0606 8998	K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884 0885	00 0504 00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606	8999 8999 8999 9999 9898 9898 9898 8999 8998	FOR OPERATION = LOCATION - 0800	264 268 270 272 274 276 278 280 280
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0882 01 0100 9898 0882 01 0100 9898 0883 00 0000 9898 0883 00 0000 8898 0884 32 256 8999 0885 00 0606 8998 0886 00 0606 8998 0887 00 0606 8998	K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884 0885 0886	00 0504 00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606	8999 8999 8999 9999 9898 9898 9898 8999 8998	FOR OPERATION = LOCATION - 0800	264 268 270 272 274 276 278 280 282 284
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0884 33 2526 8999 0885 00 0606 8998 0886 00 0606 8998	K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884 0885 0886	00 0504 00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606	8999 8999 8999 9999 9898 9898 9898 8999 8998	FOR OPERATION = LOCATION - 0800	264 268 270 272 274 276 278 280 280
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0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0884 32 526 8999 0885 00 0606 8998 0886 00 0606 8998 0886 01 0100 9898 0886 01 0100 9898 0886 01 0100 9898	K K K K K K K K K K K K K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884 0885 0886 0887	00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 01 0100 00 0000	8999 8999 8999 9898 9898 9898 9898 8998 8999 8998 8998 8998	FOR OPERATION = LOCATION - 0800	264 266 270 272 274 276 280 280 282 284 286
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0883 00 0000 9898 0884 33 2526 8999 0886 00 6606 8998 0886 00 6606 8998 0886 01 0100 9898 0888 01 0100 9898 0889 00 0000 9898 0889 00 0000 9898 0889 00 0000 9898 0889 0890 09998 0898 0899 09998 08998 0899998 089998 089998 089998 089998 089998 089998 089998 089998 089998 0899998	K K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884 0885 0886 0887 0888	00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 01 0100 00 0000 44 0505	8999 8999 9999 9898 9898 9898 9898 8999 8998 8998 8998 9898 9898	FOR OPERATION = LOCATION - 0800	264 268 270 272 274 276 278 280 282 284 286 288
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0882 01 0100 9898 0883 00 0000 9898 0884 33 2526 8999 0886 00 0606 8998 0887 00 0606 8998 0887 00 0606 8998 0888 01 0100 9898 0889 04 0505 9998 0899 44 0505 9998 0891 33 3505 9998	************	0877 0878 0879 0880 0881 0882 0883 0884 0885 0886 0887 0888 0869 0890	00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 00 0606 01 0100 00 0000 44 0505 33 0505	8999 8999 8999 9898 9898 9898 8999 8998 8999 8998 8998 9998 9998	FOR OPERATION = LOCATION - 0800	264 266 270 272 274 276 278 280 282 284 286 288 290
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0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0882 01 0100 9898 0883 00 0000 9898 0884 33 2526 8999 0885 00 6066 8998 0886 00 0606 8998 0887 00 0606 8998 0887 00 0606 8998 0889 01 0100 9898 0889 01 0100 9898 0893 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998	*************	0877 0878 0879 0880 0881 0882 0883 0884 0885 0886 0887 0889 0890 0891 0892	00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 00 0606 01 0100 00 0000 44 0505 33 0505 33 0505	8999 8999 9999 9898 9898 9898 8998 899	FOR OPERATION = LOCATION - 0800	264 266 268 270 272 274 276 278 280 282 284 286 288 290 292 294
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0882 01 0100 9898 0882 01 0100 9898 0883 00 0000 9898 0883 00 0000 9898 0883 00 0000 9898 0884 03 2526 8999 0885 00 0606 8998 0886 00 0606 8998 0887 00 0606 8998 0887 00 0606 8998 0889 0893 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998	***************	0877 0878 0879 0880 0881 0882 0883 0884 0885 0886 0887 0891 0892 0893	00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 01 0100 00 0000 44 0505 33 0505 33 0505 33 0505	8999 8999 9999 9898 9898 9898 8999 8998 8998 8998 8998 9998 9998 9998	FOR OPERATION = LOCATION - 0800	264 266 270 272 274 276 280 282 284 286 290 292 294 296
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0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0882 01 0100 9898 0882 01 0100 9898 0883 00 0000 9898 0883 00 0000 9898 0883 00 0000 9898 0884 03 2526 8999 0885 00 0606 8998 0886 00 0606 8998 0887 00 0606 8998 0887 00 0606 8998 0889 0893 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998	***************	0877 0878 0879 0880 0881 0882 0883 0884 0886 0886 0887 0890 0890 0891 0892 0893 0894	00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 01 0100 00 0000 44 0505 33 0505 33 0505 33 0505	8999 8999 9999 9898 9898 9898 8999 8998 8998 8998 8998 9998 9998 9998	FOR OPERATION = LOCATION - 0800	264 266 270 272 274 276 280 282 284 286 290 292 294 296
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0884 32 2526 8999 0885 00 0606 8998 0886 00 0606 8998 0886 00 0606 8998 0887 00 0606 8998 0888 01 0100 9898 0890 44 0505 9998 0892 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0894 33 0505 9998 0895 33 0505 9998	***************	0877 0878 0879 0880 0881 0882 0883 0884 0885 0886 0887 0891 0892 0893 0894	00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 00 0606 01 0100 00 0000 44 0505 33 0505 33 0505 33 0505 33 0505 33 0505	8999 8999 8999 9898 9898 9898 8999 8998 8998 8998 8998 9998 9998 9998 9998	FOR OPERATION = LOCATION - 0800	264 266 268 270 272 274 276 280 280 282 284 288 290 292 294 296 292
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0884 33 2526 8999 0885 00 0606 8998 0886 00 0606 8998 0887 00 0606 8998 0890 44 0505 9998 0891 33 0505 9998 0892 33 0505 9998 0893 33 0505 9998 0895 33 0505 9998 0895 33 0505 9998 0896 33 0505 9998	K K K K K K K K K K K K K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0885 0886 0887 0898 0899 0891 0892 0893 0895 0895	00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 00 0606 01 0100 00 0000 44 0505 33 0505 33 0505 33 0505 33 0505 33 0505	8999 8999 8999 9898 9898 9898 8999 8998 8998 8998 9998 9998 9998 9998 9998 9998	FOR OPERATION = LOCATION - 0800	264 266 270 272 274 276 280 282 284 286 290 292 294 296 298 300 302
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0884 33 2526 8999 0885 00 6606 8998 0886 00 0606 8998 0887 00 0606 8998 0888 01 0100 9898 0889 01 0100 9898 0889 01 0100 9898 0891 33 0505 9998 0892 33 0505 9998 0893 33 0505 9998 0894 33 0505 9998 0895 33 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0897 33 0505 9998	K K K K K K K K K K K K K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0885 0886 0887 0890 0891 0892 0893 0894 0895 0896 0897	00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 00 0606 01 0100 00 0000 44 0505 33 0505 33 0505 33 0505 33 0505 33 0505 33 0505 33 0505	8999 8999 8999 9898 9898 9898 8998 899	FOR OPERATION = LOCATION - 0800	264 266 268 270 272 274 276 280 282 284 286 268 290 292 294 295 296 300 300
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0883 02 0606 8998 0885 00 6606 8998 0886 00 6606 8998 0887 00 0606 8998 0890 44 0505 9998 0897 33 0505 9998 0897 33 0505 9998 0898 33 0505 9998 0899 33 0505 9998 0899 33 0505 9998	K K K K K K K K K K K K K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0885 0886 0887 0890 0891 0892 0893 0895 0897 0897	00 0504 00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 01 0100 00 0000 44 0505 33 0505 33 0505 33 0505 33 0505 33 0505 33 0505 33 0505	8 999 8 999 8 999 9 999 9 898 9 898 8 999 8 998 8 998 8 998 9 998 9 998 9 998 9 998 9 998 9 998 9 998 9 998 9 998	FOR OPERATION = LOCATION - 0800	264 266 270 272 274 276 278 280 282 284 286 290 292 294 296 300 302 304 306
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0884 33 2526 8999 0885 00 666 8998 0886 00 666 8998 0886 01 0100 9898 0887 33 0505 9998 0897 33 0505 9998 0897 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0899 33 0505 9998 0899 33 0505 9998 0899 33 0505 9998 0899 33 0505 9998 0899 33 0505 9998 0898 33 0505 9998 0899 33 0505 9998 0898 33 0505 9998 0899 33 0505 9998 0899 33 0505 9998 0899 33 0505 9998 0899 33 0505 9998 0899 33 0505 9998 0899 33 0505 9998	K K K K K K K K K K K K K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884 0886 0887 0898 0891 0892 0893 0894 0896 0896 0897	00 0504 00 0505 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 00 0606 00 0606 01 0100 00 0000 44 0505 33 0505	8999 8999 8999 9898 9898 9898 8999 8998 8998 9998 9998 9998 9998 9998 9998 9998 9998 9998	FOR OPERATION = LOCATION - 0800	264 266 268 270 272 274 276 280 282 284 288 290 292 294 296 300 302 304 306 308
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0883 02 0000 9898 0884 32 2526 8999 0885 00 0606 8998 0886 00 0606 8998 0887 00 0606 8998 0887 00 0606 8998 0889 04 0505 9998 0890 44 0505 9998 0891 33 0505 9998 0892 33 0505 9998 0893 33 0505 9998 0894 33 0505 9998 0895 33 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0897 33 0505 9998 0897 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998	K K K K K K K K K K K K K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884 0885 0890 0891 0892 0893 0894 0895 0896 0897 0898 0899 1250	00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 00 0606 01 0100 00 0000 44 0505 33 0505	8999 8999 9999 9898 9898 9898 8999 8998 8998 8998 9998 9998 9998 9998 9998 9998 9998 9998	FOR OPERATION = LOCATION - 0800	264 266 270 272 274 276 278 280 282 284 286 299 292 294 296 300 302 304 306 310
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0884 33 2526 8999 0885 00 6606 8998 0886 00 6606 8998 0887 00 0606 8998 0889 00 0000 9898 0890 44 0505 9998 0891 33 0505 9998 0892 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0894 33 0505 9998 0895 33 0505 9998 0896 33 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 33 0505 9998 0898 34 0505 9998 0898 34 0505 9998	K K K K K K K K K K K K K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884 0885 0886 0887 0899 0891 0892 0893 0894 0895 0896 0896 0897	00 0504 00 0505 00 0505 01 0100 00 0000 33 2526 00 0606 00 0606 00 0606 00 0606 01 0100 00 0000 33 0505 33 0505	8999 8999 8999 9898 9898 9898 8999 8998 8998 8998 9998 9998 9998 9998 9998 9998 9998 9998	FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 080	264 266 268 270 272 274 276 280 280 282 284 288 290 290 292 294 296 300 302 304 306 308 310
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0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0884 33 2526 8999 0885 00 6666 8998 0886 00 6666 8998 0887 00 0606 8998 0889 00 0000 9898 0899 00 0000 9898 0891 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0894 33 0505 9998 0895 33 0505 9998 0895 33 0505 9998 0896 33 0505 9998 0896 33 0505 9998 0898 33 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0898 33 0505 9998 0899 34 0505 9998 0895 33 0505 9998 0895 33 0505 9998 0895 33 0505 9998 0895 33 0505 9998 0895 33 0505 9998 0895 33 0505 9998 0895 33 0505 9998 0897 34 0505 9998 0897 35 0505 9998 0897 31 1000 1255 13 1215 1400 1255 13 1215 1400 1255 13 1215 1400 1255 13 1215 1400 1258 19 1821 2000 1259 12 1003 2000 1259 12 1003 2000 1259 13 1000 08080 1259 12 1003 0808 1300 19 9906 0690	K K K K K K K K K K K K K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884 0886 0887 0891 0892 0893 0894 0895 0898 1250 1251 1255 1255 1256 1257 1258 1258 1258 1258 1258 1258 1258 1258	00 0504 00 0504 00 0505 01 0100 00 0000 33 2526 00 0606 00 0606 00 0606 00 0606 01 0100 04 0505 33 0505 31 0505 32 225 07 0607 07 0609 09 0811 11 1013 13 1215 15 1417 17 1619 19 1821 21 2023 19 9906 80 0008	8999 8999 8999 9898 9898 9898 8998 899	FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 080	264 266 268 270 272 274 276 278 280 282 284 286 288 290 292 294 296 300 302 304 310 3112 314 316 318 320 322 324 326 328 330 332
0878 00 0504 8999 0879 00 0505 9999 0880 01 0100 9898 0881 00 0000 9898 0882 01 0100 9898 0883 00 0000 9898 0883 00 0000 9898 0884 32 256 8999 0885 00 6606 8998 0886 00 6606 8998 0887 00 6606 8998 0890 44 0505 9998 0891 33 0505 9998 0892 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0893 33 0505 9998 0895 33 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0898 33 0505 9998 0899 33 0505 9998 0899 34 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0896 33 0505 9998 0897 33 0505 9998 0897 31 0505	K K K K K K K K K K K K K K K K K K K	0877 0878 0879 0880 0881 0882 0883 0884 0885 0886 0887 0898 0899 1250 1251 1252 1253 1254 1255 1256 1257 1258	00 0504 00 0504 00 0504 00 0505 01 0100 00 0000 01 0100 00 0000 33 2526 00 0606 00 0606 01 0100 00 0000 44 0505 33 10505 33 10505 34 10505 35 10505 36 10505 37 10505	8999 8999 8999 9898 9898 9898 8998 899	FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 080	264 266 276 277 2774 276 278 280 282 284 286 299 292 294 296 300 302 304 306 310 3112 314 316 318 320 322 324 326 328 330

1305	99	9908	0880		K	1305	99	9908	0880		TABLE TO OPTIMIZE INDEXING OPERATIONS	340
								отн	ER CONSTAN	TS WITH	H ABSOLUTE LOCATIONS	342
1200	19	9900	0000		ĸ	1200	19	9900	0000		IF DRUM AGORESS+ USE REGULAR EXIT	344
1201	79	9900	0004		K	1201	79	9900	0084		IF NOT AN ADDRESS, ADD 4	346
		0300			K	1202 1203	80	0300 0400	0002 0004		IF 800X ADDRESS: A00 2 IF NOT AN ADDRESS: ADD 4	348 350
		0700			K	1204	80	0700	0002		IF BOOX AODRESS: ADO 2	352
		9900 5900			K	1205 1206	89 90	9900 5900	0004 0003		IF NOT AN AODRESS, ADO 4 IF CORE ADDRESS, AOD 3	354 356
1207	99	9999	0004		K	1207	99	9999	0004		IF MOT AN ADDRESS. ADD 4	358
								MA1	N ROUTINE			360
0100	69	0003	0006		N	0100	69	READC	SUBR1		INITIALIZE AT START OF ASSEMBLY	362
		0161			!	READC		R0011			READ ONE CARD	364
		1044		1050			69 24	81STX 1050	R0010	1050	RESTORE FIRST CARD TAG) RESTORE FIRST CARD TAG) MULTIBRANCH	366 368
								ORO	INARY CARO			370
		1044			N	0008		81STX			OELETE QUITT TAG)	372
		1030		1030			24 69	1030	SUB14	1030	DELETE QUITT TAG) OP, C.I., OPTIM, ALOPT, ETC.	374 376
		0089			J		69		SUB19		PROCESS L	378
0089	69	0092	0045		J		69		SUB 20		PROCESS 0	380
		0095			J			OPTIM			IS IT AN MOF OPERATION)	382
		0051 0902					94	MDFLP 0902			D. YES IS O INOEXEO	384 386
0007	44	0011	0012				44	MDFL1	ABCDE		IF SO, START FORWARD SEARCH	388
		0015				ABCDE	69	05.05	SUB21		PROCESS I	390
0015	60	0003	0057		J		60	READC	SB10A		PREPARE TO PUNCH CARD	392
								FOR	WARO SEARCI	н		394
0051	69	0004	0107		N I	MOFLP	HED 69	P	A		STARTEO SEARCH WITH MOF OPERATION	396 398
		0014				MOFL I	69		A		STARTED SEARACH WITH INDEXED O	400
1001	69	1004	0107		N I	MDFLL	69	L	A		STARTED WITH NEW-SYMBOL L	402
		1030 0086		1030	C ,	A	24	1030 SENO	LOOP	1030	STORE TAG TELLING HOW SEARCH STARTED STORE SET OF DATA)	404 406
		0044			C I	LOOP	10	SLITO	8003		STORE SET OF OATA)	408
0044	69	0151	8002		J		69	R0001	8002		STORE SET OF GATA)	410
		1125 0031		1125		SEND X	24 11	S0001	x	50001	STORE SET OF OATA) STORE SET OF OATA)	412 414
0035	15	0038	0043		•	^		16тнх	OUT		STORE SET OF DATA) STORE SET OF DATA)	416 418
		0050						QS	8003		STORE SET OF DATA)	420
0148	20	0103	0056	0103	N (оит	20	FINAL		FINAL	STORE VARIABLE OROER	422
0056	69	1050 0207	0203				69 90	1050	NO		IS THIS FIRST SET OF SEARCH) IS THIS FIRST SET OF SEARCH)	424 426
		1030 0136					69 96		c		IF SO, WHERE DIO SEARCH START WITH I OR L. RESPECTIVELY	428 430
		0160			N I	NO		R0010			IS CARO OF TYPE 08)	432
		0068						810TH QUITT			IS CARD OF TYPE 08) D. IT IS NOT, AND WE GUIT	434 436
0077	60	0151	0005				60	R0001			ALPHARETIC L	438
0005	69	0208	0061				69		SUBR3		IS L FIXEO AOORESS)	440
		0005 0026			J		35	0005 QUITT			IS L FIXEO AOORESS)	442 444
		0028					45		QUITT		IF SO, QUIT SEARCH) IF SO, QUIT SEARCH)	446
0088	69	0091	0039		c (c	69		SUB14		GET OP. C.I., TAGS, OPTIM, ALOPT.	448

0046	60	0144 0152 0060	0257		J	95 60 69	K R0002	SUBR 3		IS 0 ACTUALLY AN AOORESS IF SO. IS IT FIXEO) IF SO, IS IT FIXEO)	450 452 454
		0026 0144			J	44 45	QUITT K	BACKW		IF N G. QUIT SEARCH IF FIXEO, START BACKWARD PROCESSING	456 458
0150 0055 0307 0136	94 60 45 60	0026 0902	0307 0136 0357		C K	94 60 45	ALOPT QUITT 0902 QUITT R0003	B SUBR3		IS IT AN MOF OPERATION IF SO, QUIT SEARCH IS O INDEXED IF SO, QUIT SEARCH IS I A FIXEO ADORESS) IS I A FIXEO ADDRESS)	460 462 464 466 468 470
0173	44	0005 0026 0032	0078		J		0005 QUITT BCOEF	BACKW		IS I A FIXEO ADORESS) IF I IS N G. QUIT SEARCH IF I IS FIXEO. START BACKWARO	472 474 476
0407	16	0103 0210 0318	0115		N BCDEF		FINAL MAX	OUITT		IS STORAGE AREA FULL) IS STORAGE AREA FULL) IFSO. OUIT SEARCH	478 480 482
0457 0111 0017 0253 1007 0165	45 69 24 70 65 16	0903 0026 0114 1050 0151 0160 0068 0176	0111 0017 0253 1007 0165 0323	1050		69 24 70 65	0903 QUITT 91STX 1050 R0001 R0010 810TH	LP	1050	IS I INOEXEO IF SO, OUIT SEARCH CHANGE FIRST-CARO INDICATOR TO 2ND) CHANGE FIRST-CARO INOICATOR TO 2NO) REAO ANOTHER CARO IS IT TYPE 08) IS IT TYPE 08) O, IT IS NOT. I, IT IS,	484 486 488 490 492 494 496 498
0233 0037 0104 0105 0236	45 24 24 24 24	0152	0037 0104 0105 0236 0227	0151 0152 0153 0155	C YYY C LP	45 24 24 24 24	710 YYY R0001 R0002 R0003 R0005 FINAL	YYY LP LOOP	R0002 R0003	IS TYPE 01 D, NO. I, YES. IF SO, PUT IN OUMMY MOVEABLE WORDS) IF SO, PUT IN OUMMY MOVEABLE WORDS) IF SO, PUT IN OUMMY MOVEABLE WORDS) EITHER CASE. SOMETHING INTO ROODS ALL CASES, BACK TO START OF LOOP	500 502 504 506 508 510 512
0031	69	0155	8002		0 0	69	R0005	8002		COMPARISON CONSTANT FOR STORING	514
0050	69	0156	8002		0 Os	69	R0006	8002		TO RESTORE COMPARISON CONST + ADVANCE	516
0210	24	1200	0028	1200	Q MAX	24	SMAX1	x	SMAX1	CONSTANT FOR WHETHER STORAGE IS FULL	518
0014 1004	90 90		0000		K P K I K L K 710	90 90 90 00	0088 0089 0090 0000	0000 0000 0000 0007		TAG FOR SEARCH STARTED BY MOF TAG FOR SEARCH STARTED BY INDEXED O TAG. SEARCH STARTED BY NEW-SYMBOL L	520 522 524 526
						HED	QUI.	T WITHOUT	FIXEO /	ADORESS	528 530
		1050 0507			N OUITT	69 90	1050	SKP		WAS THERE ONLY ONE SEARCHEO CARO D, ONLY ONE.	532 534
0283	96	1030 0012 0141	0138			69 96 69	1030 ABCDE	SUB19		WHERE OID SEARCH START IF WITH I, PROCESS LIKE 08 PROCESS L	536 538 540
0141	69	0012	0045		J	69	ABCDE	SUB20		PROCESS 0. AND TO 08 ROUTINE	542
0557 0215 0022	10 22 65	0103 0260 0069 8003 0082	0215 0022 0229	0069	N SKP	10 22 65	FINAL BRNG OC 8003 SENO	LOOP 8002	oc	NOT 1ST CARO. MAKE COMP. CONST.) NOT 1ST CARO. MAKE COMP. CONST.) NOT 1ST CARO. MAKE COMP. CONST.) BRING BACK A SET) BRING BACK A SET)	544 546 548 550 552
0260	69	1125	6003		J BRNG	69	50001	8003		BRING BACK A SET)	554
0204	11 15	0151 0607 0038 0247	0143	0151	J SENO X	11	R0001 0 16,THX	X OUT	R0001	BRING BACK A SET)	556 558 560 562
0247	10	0200	8002			10	QS	6002		BRING BACK A SET)	564
0106	16	0353 0069 0226		0353	N OUT		VAR QC	R0010	VAR	STORE VARIABLE OROER IS THIS LAST SET IF SO, MULTIBRANCH + EXIT FROM OUITT	566 568 570
0226	69	0279	0039			69		SUB14		GET OP, C.I TAGS, OPTIM, ALOPT.	572
0403 0308 0333	90 69 96	1050 0657 1030 0286 031 0	0308 0333 0657		J C NO	69	1050 NO 1030 JUMP	NO SUB19		IS THIS FIRST QUITT SET O, IT IS NOT IF SO, WHERE DIO WE START D, STARTEO WITH I. I. WITH L. STARTEO WITH L. OR NOT FIRST. PROC. L	574 576 578 580 582

D310 69 02	86 0045		J	69 JUMP	SUB20		PROCESS D	584
D286 69 D1	39 0018		J JUMP	69	SVB21		PROCESS I	586
0139 69 10 0297 24 10 0453 60 02	50 0453	1050	J	69 81STX 24 1D5D 60	SB10A	1050	CHANGE TAG TO SECOND-CARD TAG 1 CHANGE TAG TO SECOND-CARD TAG) PUNCH CARD	588 590 592
0206 65 03	53 0229		J	65 VAR	LOOP		BRING VARIABLE ORDER. AND REPEAT	594
D6D7 24 D1	55 O2D4	D155	Q Q	24 RDD05	x	RDD05	COMPARISON CONSTANT FOR BRINGING SET	596
0200 24 01	56 02D4	D156	Q QS	24 RD006	x	RD006	TO RESTORE AND ADVANCE	598
				BA(CKWARDS ROUT	TINE		60D 602
0019 69 10 0503 90 07		1	N BACKW	69 105D 90	A		WAS THERE JUST ONE SEARCH CARD IF NOT > JUMP AHEAD	604 606
0707 69 10 0383 96 D3				69 103D 96	В		IF SO, WHERE DID SEARCH START D, WITH I. I. WITH L.	608 610
0336 95 00	32 0012			95 BCDEF	ABCDE		WITH I. EXIT ACCORDING TO WHY SEARCH	612
0188 69 01 0D67 24 1D 0358 69 02 0164 24 01 0D2D 69 01 0D85 24 D2 0191 69 01 0D87 24 00 0193 69 00 0D49 24 0D 0205 65 01 0757 69 D3 0013 22 01 0070 65 80 00327 16 0D	5D 0358 11 0164 17 0D20 82 D085 38 0191 84 0D87 4D 0193 96 0D49 52 02D5 03 0757 6D 0D13 6T 0D70 D1 0327	1050	N B	69 91STX 24 1D5D 69 SEN 24 VAR2X 69 PDD06 24 SAVEL 69 POO08 24 SAVED 69 DN1 24 DONE 65 FINAL 69 BRNG 22 XXXX1 65 8DD1 16 16THX	A LOOP	VAR2X SAVEL SAVED DONE	START ON L. FIRST-CARD TAG START ON L. FIRST-CARD TAG PRESET TO STORE AFTER PROCESSING PRESET TO STORE AFTER PROCESSING SAVE L FROM CARD THAT STARTED SRCH SAVE L FROM CARD THAT STARTED SRCH SAVE D FROM CARD THAT STARTED SRCH SAVE D FROM CARD THAT STARTED SRCH PRESET EXIT FROM BACKMARDS ROUTINE PRESET EXIT FROM BACKMARDS ROUTINE BRING BACK A SET BRING BACK A SET	614 616 618 620 622 624 626 628 630 632 634 638 640
0360 69 99	99 8DD3		J BRNG	69 9999	8003		BRING BACK A SET)	644
D243 10 D1	46 8DD2	1	N LOOP	10	8D02		BRING BACK A SET)	646
D146 24 D1 D4D8 11 D2 D265 16 00 D293 44 O3	61 0265 38 D293	D155	×	24 R00D5 11 Q 16 16THX 44	x out	RD005	BRING BACK A SET)	648 65D 652 654
D347 10 02	50 80D2			10 QS	8002		BRING BACK A SET)	656
0248 2D 05 0256 69 0D	09 0D39		N OUT	2D VAR 69	SUB14	VAR	STORE VARIABLE ORDER GET OP. C.I., TAGS, OPTIM, ALOPT.	658 66D
0009 65 05 D907 16 04 0315 45 04 D319 69 1D D433 96 03	1D 0315 68 0319 3D D433		J	65 VAR 16 QF 45 NO 69 1D3D 96	ι		IS THIS LAST SET) IS THIS LAST SET) D, NO. 1, YES. IF SO, WHERE DID SEARCH START D, WITH I. I, WITH L.	662 664 666 668 67D
D386 69 D1				69	SUBR6		PROCESS I BACKWARD	672
0189 69 02 0241 24 01 0135 69 DD D343 24 01	82 0135 40 0343	D182	J	69 SAVEL 24 PODD6 69 SAVED 24 PDDD8	ENDED		BRING BACK L AND D)	674 676 678 68D
D288 69 01 D090 24 00 D468 69 D1 D300 95 06 D255 6D D1 D957 69 04	52 0468 97 030D 03 0255 53 0957	D052	N L C NO	69 ENDED 24 DONE 69 ALOPT 95 SHX 6D RDD03 69	NO SUBR9	DONE	WITH L. ALTER EXIT) WITH L. ALTER EXIT) IS D AN ACTUAL ADDRESS D. NO. 1, YES. BRING ALPHABETIC I ANALYZE I, FOR TYPE OF ADDRESS	682 684 686 688 690 692
D46D 65 D1	97 0520		J	65 ALOPT	XDDD3		MULTIPLE EXIT, ACCORDING TO KIND	694
D522 15 D0			R X0005	15 13RD	X1		8DDX. CALL IT UNFIXED	696
0518 15 D0			R XDDD1	15 13RD	X1		AOORESS N G. CALL UNFIXED	698
0519 69 10 0653 9D 03			R X0002	69 1D50 90 X1	XDD04		BLANK ADORESS. IS THIS FIRST CARD FIRST, UNFIXED. OTHER, FIXED.	7D0 7D2
D52D DD DD	0D D329		R XDDD3	DD DDDD	X1		DRUM, OLD SYMB, REG. FIXED	704
D521 15 0D	75 0329		R XDOD4	15 13RD	X1		NEW SYMBOL. UNFIXED	706
0523 OD OD	DO 0519		R XDOD6	DO DDDD	×0002		CORE. TREAT SAME AS BLANK	7D8

0524 00 0 0329 20 0 0350 60 0 1057 69 0	197 0350 152 1057	0197	R X0007 C X1		0000 ALOPT R0002	X1 SUBR9	ALOPT	OTHER ADDRESS. FIXED STORE MODIFIED ALOPT ALPHABETIC D. TO SEE WHETHER FIXED ANALYZE D	710 712 714 716
0510 65 0			J		ALOPT	X0010		MULTIPLE EXIT	718
0529 15 0			R X0012		12NDX	X2		800X ADDRESS. UNFIXED	720
0525 15 0			R X0008		12NDX	X2		D IS N G. CALL UNFIXED	722
0526 69 1			R X0009	69				BLANK. IS THIS FIRST CARD	724
0703 90 0					X2	X0011		NO. FIXED. YES, UNFIXED.	726
0527 00 0			R X0010	00	0000	F		OLD SYMBOL, DRUM, REGION. FIXED	728
0528 15 0			R X0011		12NDX	X2		NEW SYMBOL. UNFIXED	730
0530 91 0			R X0013		X0009	X0008		CORE. BRANCH, LIKE BLANK. ARITH. UNF	732
0531 01 0			R X0014	01	0666	X0014		OTHER. ERROR. SHOULD NOT BE HERE.	734
0187 20 0 0081 91 0 0436 99 0	034 0436	0197	N X2 C F		ALOPT XXB	F MISC	ALOPI	STORE MODIFIED ALOPT MULTIPLE BRANCH ACCORDING TO TAGS) MULTIPLE BRANCH ACCORDING TO TAGS)	736 738 740
0140 98 6	291 0145			98	MISC	899		MULTIPLE BRANCH ACCORDING TO TAGS)	742
0034 99 0	338 0239		N XX8	99		9X8		MULTIPLE BRANCH ACCORDING TO TAGS)	744
0338 98 0	341 0393			98	888	898		MULTIPLE BRANCH ACCORDING TO TAGS)	746
0261 24 0	151 0408	0151	00	24	R0001	x	R0001	COMPARISON CONSTANT FOR END OF SET	748
0250 20 0	150 0408	0150	Q QS	24	R0000	x	R0000	RESTORE COMPARISON CONSTANT AND MODIFY	750
0410 69 1	124 8003		Q QF	69	50000	8003			752
0075 00 1	000 0000		K 13RD	00	1000	0000			754
0291 69 0 0194 69 0 0397 69 0	397 0400		N MISC J J LNM		LNM DONE	SUBR6 SUBR5 SUBR4	SOIH UNF	FIXED, ARITHMETIC PROCESS I BACKWARDS PROCESS D BACKWARDS PROCESS L BACKWARDS	756 758 760 762
6327 6 2 6	032 0303					FT OR INDE	EXING OF		764
0603 69 0	306 0045		N SHX	69		SUB20		PROCESS D FORWARDS	766
0306 69 0			J		LNM	SUBR6		PROCESS I BACKWARDS	768
					UNF	IXED I. FI	XED D.	ARITHMETIC	770
0145 69 0	298 0400		N 899	69		SUBR5		PROCESS D BACKWARDS	772
0298 69 0	101 0018		J	69		SUB21		PROCESS I FORWARDS	774
0101 65 0	397 0201		J	65	LNM	SUB 22		SAVE ORCEQ	776
					UNF	IXFD I. FI	XED D.	BRANCH OPERATION	778
0393 69 0	196 0400		N 898	69		SUBR5		PROCESS D BACKWARDS	780
0196 69 0			J	69		SUBR4		PROCESS L BACKWARDS	782
0149 69 0			J		LN	SUB21		PROCESS I FORWARDS	784
0102 65 0			J LN		DONE	SUB22		SAVE ORCEQ	786
									, , ,
					UNF	IXED D. BR	RANCH OP	ERATION	788
0239 69 0	192 0142		N 9X8	69		SUBR6		PROCESS I BACKWARDS	790

0192 69 0195 0305	J	69	SUBR4	PROCESS L BACKWAROS	792
0195 69 0102 0045	J	69 LN	SUB20	PROCESS D FORWARDS	794
•	,	FI	EO D AND I BRA	NCH OPERATION	796
0341 69 1679 0232 0232 24 0235 0388 0235	N 888	69 BLANB 24 T1	T1	SAVE IN CASE I IS BLANK SAVE IN CASE I IS BLANK	798 800
0388 69 0391 0244 0244 24 0447 0450 0447		69 ORCEB 24 T2	T2	SAVE IN CASE I IS CORE) SAVE IN CASE I IS CORE)	802 804
0450 65 0197 0251 0251 16 0254 0059		65 ALOPT 16 11STX		ALOPT TO LOWER CHANGE ITS FIRST DIGIT TO 8	806 808
0059 20 0197 0500 0197 0500 69 0753 0400		20 ALOPT 69	SUBR5 ALOP	T STORE MODIFIED ALOPT PROCESS D BACKWARDS	810 812
0753 69 0356 0305	J	69	SUBR4	PROCESS L BACKWAROS FROM 0	814
0356 65 0109 0113	J	65	SSB	BRING BACK BLANB AND ORCEB	816
0109 65 0062 0217 0217 14 0320 1036	J	65 OPREG 14 50IXX		SAVE DYNAMIC LEVEL OF L FROM 0) SAVE DYNAMIC LEVEL OF L FROM D)	818 820
1036 21 1091 1094 1091 1094 65 0197 0301		21 OLO 65 ALOPT	OLO	SAVE DYNAMIC LEVEL OF L FROM 0) MODIFY TO USE ROUTINE FOR UNFIXED 0)	822 824
0301 15 0132 0237 0237 20 0197 0550 0197 0550 69 0953 0142		15 12NOX 20 ALOPT 69	ALOP SUBR6	MODIFY TO USE ROUTINE FOR UNFIXED D) T MODIFY TO USE ROUTINE FOR UNFIXED D) PROCESS I BACKWARDS	826 828 830
0953 69 0406 0305	J	69	SUBR4	PROCESS L BACKWARDS FROM I	832
0406 65 0062 0267 0267 14 0320 1080	J	65 OPREG 14 50IXX		WHICH L IS LESS. MEASURED ON CIRCLE) WHICH L IS LESS. MEASURED ON CIRCLE)	834 836
1080 65 8003 1038 1038 16 1091 0245		65 8003 16 DL0		WHICH L IS LESS, MEASURED ON CIRCLE) WHICH L IS LESS, MEASURED ON CIRCLE)	838 840
0245 46 0348 0199 0199 16 0202 1107		46 AEB 16 251XX	вот	WHICH L IS LESS MEASURED ON CIRCLE) WHICH L IS LESS MEASURED ON CIRCLE)	842 844
0348 15 0202 1107 1107 46 0560 0311	N AEB C BOT	15 251XX 46	BOT 2NO	WHICH L IS LESS, MEASURED ON CIRCLE) D. WE WILL USE ONE MEASURED FROM D	846 848
0560 65 0163 0113		65	SSB	BRING BACK BLANB AND ALOPT ONCE MORE	850
0163 69 0066 0400	J	69	SUBR5	PROCESS BACKWAROS O ONCE MORE	852
0066 65 0197 0351 0351 16 0132 0287	J	65 ALOPT 16 12NOX	XY	MODIFY ALOPT AGAIN) MODIFY ALOPT AGAIN)	854 856
0287 15 0254 0209 0209 20 0197 0397 0197	C XY	15 11STX 20 ALOPT		MODIFY ALOPT AGAIN) T STORE NEW ALOPT. AND JUMP BACK	858 860
0311 65 0214 0113	N 2ND	65	SSB	USE I-COMP. BRING BLANB AND ORCEB	862
0214 69 0317 0142	J	69	SUBR6	PROCESS I BACKWAROS AGAIN	864
0317 65 0197 0287	J	65 ALOPT	XY	BRING ALOPT. AND JUMP BACK	866
0113 69 0235 0438 0438 24 1679 0282 1679	N SSB	69 T1 24 BLANB	BLAN	SPEC. SUBR. BRING BACK BLANB + ORCEB B SPEC. SUBR. BRING BACK BLANB + ORCEB	868 870
0282 69 0447 0600 0600 24 0391 8002 0391		69 T2 24 ORCEB		SPEC. SUBR. BRING BACK BLANB + ORCEB B SPEC. SUBR. BRING BACK BLANB + ORCEB	872 874
0096 65 0117 0321	J ONI	65 VAR2X		ALL CASES. STORE PROCESSED CARD)	876
0321 10 0024 8003 0024 69 0186 8002		10 69 P0010	8003 8002	STORE PROCESSED CARD) STORE PROCESSED CARD)	878
0211 24 1199 0252 1199	J SEN	24 SMAXM		M STORE PROCESSED CARD)	882
0252 11 0355 0259 0259 16 0038 0443	O SER	11 02 16 16THX	J. C.	STORE PROCESSED CARD) STORE PROCESSED CARD)	884 886
0443 44 0497 0398		44	OUT 2	STORE PROCESSEO CARD)	888
0497 10 0650 8003		10 QS2	8003	STORE PROCESSED CARD)	890
0398 20 0117 0570 0117 0570 65 0553 0243	N OUT2	20 VAR2X 65 VAR	LOOP VAR2	X STORE PROCESSED CARO) BRINGING ORDER. BACK FOR ANOTHER CARO	892 894
0355 69 0182 8002	Q 02	69 P0006	8002	COMPARISON CONSTANT FOR END OF SET	896
0650 69 0181 8002	Q QS2	69 P0005	8002	RESTORE CONSTANT AND MODIFY	898
	٠		CKWARDS PUNCH		900
0137 65 0117 0571	J ENOED	65 VAR2X		MAKE NEW BRINGING OROER)	902 904
0137 65 0117 0571 0571 69 0074 0377 0377 22 0167 0620 0167	J ENUED	69 BRNG 22 XXXX1	LOOP XXXX	MAKE NEW BRINGING ORDER) (1) MAKE NEW BRINGING ORDER)	904 906 908
0311 22 0101 0020 0161		22 78771		A THE HER CATIOTIO CAPEA /	,,,,

0620 60 0673 0057	C LOOP 60	SB10A	TO SUB 10A TO PUNCH ONE CARO	910
0673 65 0167 0621 0621 16 0174 0379 0379 45 0332 0483	J 65 XXXX 16 OL 45	OVR	BRING BACK A SET OF RESULTS) BRING BACK A SET OF RESULTS) BRING BACK A SET OF RESULTS)	912 914 916
0332 15 8001 0289 0289 10 0242 0547 0547 15 0038 8002	15 8 10 SENO C A 15 16TH		BRING BACK A SET OF RESULTS) BRING BACK A SET OF RESULTS) BRING BACK A SET OF RESULTS)	918 920 922
0074 69 9999 8003	J BRNG 69 9	999 8003	BRING BACK A SET OF RESULTS)	924
0242 24 0182 0285 01 0285 11 0488 0493 0493 44 0597 0448	82 J SEND 24 P000 X 11 0	06 X P0006	BRING BACK A SET OF RESULTS) BRING BACK A SET OF RESULTS) BRING BACK A SET OF RESULTS)	926 928 930
0597 10 0700 0547	10 OS	A	BRING BACK A SET OF RESULTS)	932
0448 20 0167 0620 01	.67 N OUT 20 XXXX	1 LOOP XXXX1	STORE MODIFIED BRINGING ORDER + REPEAT	934
0483 69 0486 0339 0339 24 0292 0003 02	N OVR 69 SAVO		FINISHEO. SAVE SAVOR AS ORCEO) FINISHED. SAVE SAVOR AS ORCEO)	936 938
0488 24 0186 0285 01	86 0 0 24 P001	0 X P0010		940
0700 24 0187 0285 01	87 O OS 24 POO1	1 X P0011		942
0174 69 1199 8003	O QL 69 SMAX	M 8003		944
	HEO	SUBROUTINE 1. INIT	IALIZE AT START OF A PROGRAM	946 948
0006 24 0178 0231 01		Y FXITY	STORE EXIT	950
0231 61 0134 8003	61	8003	CLEAR REGION AND SYMBOL TABLES)	952
0134 20 189° 0302 18 0302 10 0405 0309 0309 46 0112 0213	99 J 20 ZMAX 10 QA 46	1 ZMAX1	CLEAR REGION AND SYMBOL TABLES) CLEAR REGION AND SYMBOL TABLES) CLEAR REGION AND SYMBOL TABLES)	954 956 958
0112 11 0365 8003	11 QSA	8003	CLEAR REGION AND SYMBOL TABLES)	960
0213 20 0181 0234 01			CLEAR CARO NUMBER	962
0234 69 1044 0647 0647 24 1669 0072 16 0072 65 0175 0429	69 81ST	T DRUMT	PRESET DRUM TAG) PRESET DRUM TAG)	964 966
0429 10 0382 8003	65 AVAL 10	8003	MAKE ORUM AVAILABLE) MAKE ORUM AVAILABLE)	968 970
0382 20 1554 1307 15 1307 11 0610 0415 0415 46 0178 0569 0569 10 0322 8003	54 J 20 A020 11 QB 46 EXIT 10 QSB		MAKE ORUM AVAILABLE) MAKE DRUM AVAILABLE) MAKE ORUM AVAILABLE) MAKE ORUM AVAILABLE)	972 974 976 978
0405 20 1661 0000 16			COMPARISON CONSTANT	980
	60 Q QSA 20 G000		RESTORE COMPARISON CONSTANT AND MODIFY	982
	56 Q QB 20 A000		COMPARISON CONSTANT	984
0322 20 1355 0000 13			RESTORE COMPARISON CONSTANT AND MODIFY	986
0175 11 1111 1111			AVAILABILITY WORD	988
	HEO	SUBROUTINE 2. RESER	RVE OR UNRESERVE A BLOCK OF ORUM	990 992
	EQU SA	HSYMB	OOUBLE-PURPOSE TO CONSERVE ORUM SPACE	994
0750 21 0304 0458 03 0458 35 0001 0465 0465 65 8002 0723 0723 10 0326 0281 0281 30 0001 0337 0337 10 0304 0359	35 0 65 8 10 W	001 002 001 SPR	REPLACE DIGIT OF AVAIL. WORD BY W)	998 1000 1002 1004 1006
0900 65 1003 0508	R 0900 65 N		HAVE WE FINISHED	1008
0508 45 0162 0178	45	EXITY	D. WE HAVE NOT FINISHED. I. WE HAVE.	1012
0162 16 0515 0619 0619 20 1003 0456 10 0456 60 0108 0263 0263 11 0116 0671 0671 46 0324 0225	16 1107 20 N 60 SA 11 796	H N	REDUCE NUMBER YET TO BE DONE) REDUCE NUMBER YET TO BE DONE) ARE WE TO LAST LINE OF TABLE) ARE WE TO LAST LINE OF TABLE) D. NOT LAST LINE.	1014 1016 1018 1020 1022
0324 10 0427 0331	10 800	su	RESTORE. AND TAKE WORD FROM NEXT LINE	1024
0331 21 0108 0361 01 0361 10 0264 8003	08 C SU 21 SA 10 C4	8003	STORE VARIABLE STORING ORDER MAKE VARIABLE BRINGING ORDER	1026 1028

1025 24 0178 0381 0381 69 1680 0533	0178 N	SUB2R	24 EXITY 69 ZEROX	RU	EXITY	ENTRY TO RESERVE. STORE EXIT. BRING ZERO TO INDICATE RESERVATION	1030 1032
1075 24 0178 0431 0431 69 0515 0533	0178 N	SUB2U	24 EXITY 69 110TH	RU	EXITY	ENTRY TO UNRESERVE. STORE EXIT. BRING UNITY TO INDICATE UNRESERVATION	1034 1036
0533 24 0326 0479		RU	24 W	KO .	W	STORE 0 OR 1	1038
0479 21 0284 0387 0387 20 1003 0506	0284 1003		21 XXXXA 20 N		N N	STORE INITIAL AOORESS TO BE RESERVEO STORE N-1	1040 1042
0506 11 0409 0313 0313 46 0166 0178			11 2000 I 46	EXITY		IS INITIAL ADDRESS LESS THAN 2000 I, OVER 1999. WE RESERVE NOTHING	1044 1046
0166 10 1003 0558			10 N			UPPER, LAST ADDRESS - 2000	1048
0558 46 0411 0212 0212 16 8003 0669			46 OK 16 8003			I, LAST ONE WOULD BE OVER 1999 MODIFY TO END WITH 1999)	1050 1052
0669 16 0515 0719 0719 20 1003 0411	1003		16 110TH 20 N	οκ	N	MOOIFY TO ENO WITH 1999) MOOIFY TO ENO WITH 1999)	105 4 1056
0411 60 0284 0389 0389 10 8001 0295		OK	60 XXXXA 10 8001			MAKE SEVERALVARIABLE OROERS) MAKE SEVERAL VARIABLE OROERS)	1058 1060
0295 30 0003 1053 1053 21 0658 0461	0658		30 0003 21 X		x	MAKE SEVERAL VARIABLE OROERS) MAKE SEVERAL VARIABLE OROERS)	1062 1064
0461 11 8001 0367 0367 35 0001 0773			11 8001 35 0001		.,	MAKE SEVERAL VARIABLE OROERS) MAKE SEVERAL VARIABLE OROERS)	1066 1068
0773 21 0228 0481 0481 11 8001 0437	0228		21 P		P	MAKE SEVERAL VARIABLE OROERS)	1070
0437 35 0002 0543			11 8001 35 0002			MAKE SEVERAL VARIABLE OROERS) MAKE SEVERAL VARIABLE OROERS)	1072 1074
0543 10 8003 0401 0401 10 0658 0363			10 8003 10 X			MAKE SEVERAL VARIABLE OROERS) MAKE SEVERAL VARIABLE OROERS)	1076 1078
0363 15 0228 0583 0583 35 0004 0593			15 P 35 0004			MAKE SEVERAL VARIABLE OROERS) MAKE SEVERAL VARIABLE OROERS)	1080 1082
0593 69 0246 0249 0249 22 0901 0354	0901		69 C1 22 0901		0901	MAKE SEVERAL VARIABLE OROERS) MAKE SEVERAL VARIABLE OROERS)	1084 1086
0354 69 9708 0511 0511 22 0359 0262	03 59		69 C2 22 SPR		SPR	MAKE SEVERAL VARIABLE OROERS) MAKE SEVERAL VARIABLE OROERS)	1088 1090
0262 10 0565 0331			10 C3	SU		MAKE SEVERAL VARIABLE OROERS)	1092
0225 65 0359 0413 0413 16 0708 0463	N	TP	65 SPR 16 C2			BOTFOM LINE OF TABLE IS IT ALSO RIGHT ENO OF WORD	1094 1096
0463 45 0216 0417			45	ZP		0, NO	1098
0216 15 0769 0973 0973 69 0246 0299			15 C5 69 C1			MODIFY TO TAKE NEXT COLUMN OF TABLE) MODIFY TO TAKE NEXT COLUMN OF TABLE)	1100
0299 22 0901 0404	0901		22 0901			MODIFY TO TAKE NEXT COLUMN OF TABLE)	1102 1104
0404 20 0359 0312 0312 60 0108 0513	0359		20 SPR 60 SA		SPR	MODIFY TO TAKE NEXT COLUMN OF TABLE) MODIFY TO TAKE FIRST LINE. SAME COLUMN	1106 1108
0513 11 0266 0331			11 C6	SU		MODIFY TO TAKE FIRST LINE. SAME COLUMN	1110
0417 69 0246 0349 0349 24 0901 0454	0901 N	ZP	69 C1 24 0901		0901	LAST LINE AND END OF WORD. MODIFY) LAST LINE AND END OF WORD. MODIFY)	1112 1114
0454 69 0758 0561 0561 24 0359 0362	0359		69 C7 24 SPR		SPR	LAST LINE AND END OF WORD. MODIFY) LAST LINE AND END OF WORD. MODIFY)	1116 1118
0362 60 0108 0563 0563 11 0316 0331			60 SA 11 CB	su		LAST LINE AND END OF WORD. MODIFY) LAST LINE AND END OF WORD. MODIFY)	1120 1122
0246 35 0000 0750	P	C1	35 0 0 00	xx		TO PRESET LEFT SHIFT ORDER	1124
0708 30 0009 0108	Р	C2	30 0009	SA		PRESETTER AND ALSO COMPARISON CONSTANT	1126
0565 20 1355 0900	1355 P	C3	20 A0001	0900	A0001	INITIAL OF STORING ORDER	1128
0264 45 0000 0001	Р	C4	45 0000	0001		OIFFERENCE OF BRINGING AND STORING ORD	1130
0116 20 1551 0900	1551 Q	796	20 A0197	0900	A0197	COMPARISON CONSTANT FOR LAST LINE	1132
0427 20 1555 0900	1555 Q	800	20 A0201	0900	A0201	TO RESTORE FOR NEXT LINE OF TABLE	1134
0769 30 0010 0108	0	C5	30 0010	SA		TO RESTORE AFTER SUBTRACTING C2	1136
0266 00 0196 0000	Р	C6	00 0196	0000		TO MODIFY BRINGING ORDER FOR NEXT COL	1138
0758 30 0000 0108	p	C7	30 0000	SA		PRESETTER FOR START OF NEW COLUMN	1140
0316 00 0195 0000		C8	00 0195	0000		MODIFY BRINGING ORDER TO START NEW COL	1142
			SUB HEO	R 3 FINO	WHETHE	R AOOR IN UPPER IS FIXEO	1144 1146
0061 24 0177 0030	0177 N	SUBR3	24 EXITX		EXITX	STORE EXIT	1148
0030 69 0633 0063			69	SUBR9		TO SUBROUTINE 9 TO ANALYZE THE ACORESS	1150
0633 65 0536 0220	J		65 EQUIV	F0003		BRING EOUIV AND MULTIBRANCH	1152
0218 60 0068 0177	R	F0001	60 810TH	EXITX		AOORESS IS N G	1154
0219 65 0068 0177	R	F0002	65 810TH	EXITX		BLANK ADORESS	1156
0220 65 1680 0177	N	F0003	65 ZEROX	EXITX		ORUM AOORESS+ OR EQUIVALENT TO ORUM	1158
0221 65 0068 0177	R	F0004	65 810TH	EXITX		SYMBOLIC ACCRESS. WITH UNCEFINED SYMB	1160

0222 35 0005 0177	R F0005	35 0005	EXITX	800X ADDRESS	1162
0223 65 0068 0177	R F0006	65 810TH	EXITX	CDRE ADDRESS	1164
0224 60 0068 0177	R F0007	60 810TH	EXITX	OTHER ADDRESS. USUALLY PART DF CONST.	1166
		SU HED	BR 4 PRDCESS	BACKWARDS L	1168 1170.
0305 24 0177 0080 0	177 N SUBR4	24 EXITX	E	EXITX STORE EXIT	1172
0080 60 0151 0455 0455 69 0908 0063		60 R0001 69 PRE	SUBR9	ALPHABETICAL L INTO UPPER ANALYZE THE ADDRESS	1174 1176
0908 65 0536 0271	J PRE	65 EDUIV	M0004	EQUIVALENT TO LOWER. MULTIBRANCH	1178
0268 20 1679 0271 1	679 N M0001	20 BLANB	M0004 E	BLANE STORE EDUIVALENT DE BLANK ADDRESS	1180
0269 60 0622 0627	R M0002	60 87THX	SB10B	N. G. DMIT PUNCHING	1182
0270 69 1044 0697	R M0003	69 81STX		BLANK. CHANGE FIRST-CARD TAG)	1184
0697 24 1050 1103 1 1103 65 0556 0611	050	24 1050 65	SUB11	1050 CHANGE FIRST-CARD TAG) FIND BEST EQUIVALENT TO BLANK	1186 1188
0556 00 0989 0268		00 0989	M0001	TAGS AND EXIT FOR SUBRDUTINE 11	1190
0271 20 018 0335 0	182 N M0004	20 P0006	SB10C F	POOD6 DRUM ADDRESS. STDRE FDR PUNCHING	1192
0272 65 0325 0611	R M0005	65	SUB11	NEW SYMBOL. FIND BEST EDUIVALENT	1194
0325 00 0989 0276	J	00 0989	M0009	TAGS AND EXIT FOR USE IN SUBROUTINE 11	1196
0273 01 0555 0273	R M0006	01 0555	M0006	800X ADDRESS. STDP THE MACHINE	1198
0274 20 0182 0385 0 0385 69 0538 0441	182 R M0007	20 P0006 69	SUB13	POOO6 CORE ADDRESS. STDRE FOR PUNCHING FIND DYNAMIC LEVEL DF CDRE ADDRESS	1200 1202
0538 00 0909 0342 0342 20 0391 0335 0	J 391	00 0909 20 ORCEB	SB10C D	TAGS AND EXIT FOR USE IN SUBR 13 PRCEB STORE DYNAMIC LEVEL OF CORE ADDRESS	1204 1206
0275 01 0555 0275	R M0008	01 0555	M0008	DTHER ADDRESS. STDP MACHINE	1208
0276 69 0197 0950 0950 90 0271 0505 0505 69 0908 0661	N M0009	69 ALOPT 90 M0004 69 PRE	SUBR7	EDUIV OF NEW SYMBDL. D. CASE WHERE WE DUPLICATE COMPUTATION USUAL CASE. STORE SYMBOL AND EOUIV	1210 1212 1214
0277 00 0000 0269	R M0010	00 0000	M0002	NEW SYMBOL, BUT SYMBOL TABLE FULL	1216
		su	BROUTINE 5	PROCESS BACKWARDS D	1218
		HED			1220
0400 24 0177 0230 0 0230 60 0152 0958 0958 69 0711 0063	177 N SUBR5	24 EXITX 60 R0002 69 PRE	SUBR9	XITX STORE EXIT ALPHARETIC D INTO UPPER ANALYZE THE ALPHABETIC D ADDRESS	1222 1224 1226
0711 65 0536 0921	J PRE	65 EQUIV	C0004	BRING EQUIVALENT. MULTIBRANCH	1228
0918 20 1023 0376 1	023 N C0D01	20 BLANK	A E	BLANK STORE EQUIV OF BLANK FOR FORWARD L	1230
0919 60 0672 0627	R C0002	60 88THX	SB10B	N G. OMIT PUNCHING	1232
0920 69 1050 1353 1353 90 1008 1058	R C0003	69 1050 90	881	BLANK ADDRESS. WAS THERE BLANK BACK L D. THERE WAS A BLANK BACKWARDS L	1234 1236
1008 65 1679 0376		65 BLANB	A	BRING EDUIVALENT OF BLANK BACKWARD L	1238
1058 65 0761 0611	N BB1	65	SUB11	GET BLANK D DYNAMICALLY FROM I	1240
0761 00 0988 0918	J	00 0988	C0001	TAGS AND EXIT FOR SUBROUTINE 11	1242
0921 69 0624 0677	N C0004	69	INDEX	DRUM OR EDUIVALENT. INDEX IF TAGGED	1244
0624 00 0000 0376	J	00 0000	A	TAG-IDENTIFICATION + AND EXIT FROM 18	1246
0922 65 0625 0611	R C0005	65	SUB11	NEW SYMBOL. FIND BEST EQUIVALENT	1248
0625 00 0988 0926	J	00 0988	C0009	EXIT AND TAGS FOR SUBROUTINE 11	1250
0923 69 0426 0441	R C0006	69	SUB13	BOOX ADDRESS. GET DYNAMIC LEVEL	1252
0426 00 0908 0280 0280 69 0683 0586	J	00 0908 69	SUB17	TAGS AND EXIT FOR SUBROUTINE 13 CORRECTION TO DYNAMIC LEVEL	1254 1256
0683 66 8002 0491 0491 15 0294 0335	J	66 8002 15 XXXX2	SB10C	CHANGE SIGN OF CORRECTION ADD TO GIVE MODIFIED DYNAMIC LEFEL	1258 1260
0924 69 0727 0677	R C0007	69	INDEX	CORE ADDRESS. INDEX IT	1262

0727 00 0631 20 0487 69	0184	0487	0184	J	00 20 69	0000 P0008	SUB13	P0008	ADDEND AND EXIT FOR SUBROUTINE 18 STORE CORE ADDRESS FOR PUNCHING GET DYNAMIC LEVEL OF CORE ADDRESS	1264 1266 1268
0190 00	0908	0344		J	00	0908			TAGS AND EXIT FOR SUBROUTINE 13	1270
0344 69					69 90	1050 SB10C			FIRST-CARD TAG D. WE SHOULD STORE THIS DYNAMIC LEVEL	1272 1274
0459 20			0486			SAVOR	SB10C	SAVOR	STORE DYN LEV OF CORE, AND FINISH UP	1276
0376 20 0925 20			0062 0184	N A R C0008		OPREG P0008	COOO8 EXITX		STORE ADDRESS FOR OPTIMIZING NEXT ADDR MISC ADDR. STORE FOR PUNCHING. EXIT	1278 1280
0926 69	0711	0661		N C0009	69	PRE	SUBR7		STORE EQUIVALENT OF NEW SYMBOL	1282
0927 00	0000	0919		R C0010	00	0000	C0002		NEW SYMBOL. BUT TABLE FULL. N.G.	1284
				•						
					HED	SUE	ROUTINE 6	PROC	ESS BACKWARDS I	1286 1288
0142 24	0177	0330	0177	N SUBR6	24	EXITX		EXITX	STORE EXIT	1290
0330 60 1108 69	0153	1108			60	R0003 PRE	SUBR9		ALPHABETIC'I TO UPPER ANALYZE ALPHABETIC I	1292 1294
				J PRE						1296
0911 69						EOUIV	J0004		BRING EOUIVALENT. MULTIBRANCH	
0368 69				N J0001		PRE	SUBR 7		STORE EQUIVALENT OF NEW SYMBOL	1298
0369 60	0722	0627		R J0002	60	вэтнх	SB10B		N.G. OMIT PUNCHING	1300
0370 69 0772 90				R J0003	69 90	DRUMT	J0002		BLANK I, IS DRUM FULL D. DRUM IS NOT FULL	1302 1304
0626 65			0062	N J0004		BLANB OPREG	J0004	OPREG	BRING EOUIVALENT OF BLANK BACKWARD L DRUM OR DRUM EOUIVALENT	1306 1308
0615 69					69		INDEX		TO SUBROUTINE 18 TO INDEX	1310
0568 00	0001	0375		J	00	0001	J0008		ADDEND AND EXIT FOR SUBROUTINE 18	1312
0372 65	0675	0611		R J0005	65		SUB11		NEW SYMBOL. FIND BEST VALUE	1314
0675 00	0990	0368		J	00	0990	J0001		TAGS AND EXIT FOR SUBROUTINE 11	1316
0373 0	0000	0373		R J0006	01	0000	J0006		800X RANGE. ERROR.	1318
0374 69	0391	0371		R J0007	69	ORCEB	J0004		CORE. BRING DYNAMIC LEVEL	1320
0375 20	0185	0177	0185	R J0008	20	P0009	EXITX	P0009	OTHER ADDRESS, USUALLY A CONSTANT	1322
					HED	SUE	ROUTINE 7	STORE	SYMBOL AND ITS EQUIVALENT	1324 1326
0661 24	0170	0422	0179	N SUBR7		EXITZ		EV:T7	STORE EXIT	1328
0432 69	0435	0439	0179	N SOBRI	65	LSYMB		FVIIZ	SYMBOL-STORING ORDER)	1330
0439 15 0747 69						SS HSYMB	8002		SYMBOL-STORING ORDER) STORE SYMBOL)	1332 1334
0392 24			1689	J SS		Z0001		Z0001	STORE SYMBOL)	1336
0442 69						LSYMB 2DXXX			LOCATION OF EOUIVALENT RELATIVE TO E1 LOCATION OF EOUIVALENT RELATIVE TO E1	1338 1340
1029 35			0294		35 20	0004 XXXX2		XXXX2	LOCATION OF EQUIVALENT RELATIVE TO E1 LOCATION OF EQUIVALENT RELATIVE TO E1	1342
0797 15 0555 20	1000	0555	0167		15				MAKE BRINGING ORDER) MAKE BRINGING ORDER)	1346 1348
0670 44	1073	0674	0107		44	IPOS		20001	D: USE I-POSITION. I: USE D-POSITION. BRING EQUIVALENT	1350 1352
0674 69	0004	0451			35	EOUIV 0004			SHIFT TO D POSITION	1354
0451 10 0509 10				C A	10 10	P2 XXXX2	A XXXX1		MAKE STORING ORDER) MAKE STORING ORDER)	1356 1358
1073 65 0591 10				N IPOS		EOUIV P3	A		USE I-POSITION. BRING EQUIVALENT MAKE STORING ORDER	1360 1362
1000 65				P P1		E0001	8003		INITIAL OF BRINGING ORDER	1364
0554 2			1555	P P2		E0001	EXITZ	EOOO	INITIAL OF ORDER TO STORE D-POSITION	1366
0394 2				P P3		E0001	EXITZ		INITIAL OF ORDER TO STORE I-POSITION	1368
0394 2	1333	3119	1000	F F 3	23	20001	ENTIL	20001	THE STORE TO STORE 1-1031110H	1550
					HED	SU	R 8 PROCE	SS TYP	E 2 ADDR. ALPH IN UPPER, NUMERIC, LOWR	1370 1372
1024 24	4 0177	0380	0177	N SUBR8	24	EXITX		EXITX	STORE EXIT	1374

		0254 0412				11 46	11STX	FXT		IS FIRST POSITION BLANK I. FIRST IS NON-BLANK. FIXED AGGRESS.	1376 1378
0969 0777	60 11	8001 8002 0409 0366	0777 0663			10 60 11 46	8001 8002 2000 I	RC		RESTORE TO POSITIVE NUMERIC ADDRESS ALONE IN UPPER SUBTRACT 2000 0, ORUM. I. CORE.	1380 1382 1384 1386
		1019 0676				10 46	OOIFF	BAO		ORUM. AOO RELOCATION AMOUNT I. RELOCATEO ORUM WILL EXCEEO 1999	1388 1390
0676	10	0409	0713			10	20001	RES		RESTORE RELOCATED DRUM ADDRESS	1392
1223 0681	10 11	8001 0726 0334 0542	0681 0539		N RC		8001 C0 IFF 9060	BAO		CORE AOORESS. RESTORE THE 2000 ADD RELOCATION AMOUNT SUBTRACT 9060 I. RELOCATEO CORE ADORESS TOO HIGH	1394 1396 1398 1400
0713	21	8001 0167 1273	0720	0167	C RES	10 21 69	8001 XXXX1	RES SUB2R	XXXX1	RESTORE THE 9060 STORE ADORESS TEMPORARILY RESERVE IF ORUM ADORESS	1402 1404 1406
1273	65	0167	0177		J	65	XXXX1	EXITX		EOUIVALENT BACK TO LOWER AND EXIT	1408
0613	65	8002	0177		N FXT	65	8002	EXITX		FIXED ADDRESS. CLEAR UPPER AND EXIT.	1410
0977	60	0622	0177		N BAD	60	87 THX	EXITX		MODIFIED ADDR TOO HIGH. 8000 TO UPPER	1412
0334	00	0000	9060		K 9060	00	0000	9060			1414
						HEO	SUB	ROUTINE 9.	ANAL	YZE AN AOORESS	1416 1418
1002	44	1005	0606		C LOOP	44		UND		I. SYMBOL IS NOT IN THE TABLE	1420
	44	0108 0517 0517	0618			44	HSYMB NZ NZ	DEF		SOME SYMBOL WAS FOUND. SUBTRACT OURS O, IT WAS NOT RIGHT ONE O, IT WAS NOT RIGHT ONE . 1, IT AS.	1422 1424 1426
0517 1323 0731	65	8002	0731		C NZ	10 65 15	8001 8002 T	8002		WRONG SYMBOL. RESTORE UPPER TO PLUS CLEAR UPPER AOVANCE LOWER AND BRING ANOTHER	1428 1430 1432
0063 0482 0537	45	0636		0179	N SUBR9	45	EXITZ ABC 110TH	OON	EXITZ	STORE EXIT 1. THE ADDRESS IS BLANK MOOIFY EXIT AND PREPARE TO OUIT	1434 1436 1438
0629 0947 0604 0913	30 21 11 16 46 11	0008 0294 8001 1208 0416 8003	0629 0947 0604 0913 0567 0725	0108 0294	N ABC	30 21 11 16	HSYMB 0008 XXXX2 8001 909 SYM 8003	LOO OUT		AOORESS NOT BLANK. STORE SYMBOL ALSO STORE FIRST LETTER OF AOORESS) ALSO STORE FIRST LETTER OF ADORESS) CLEAR FIRST LETTER SUBTRACT 9090908995 O. ADDRESS IS SYMBOLIC. ARE LAST FOUR CHARACTERS DIGITS) ARE LAST FOUR CHARACTERS DIGITS)	1440 1442 1444 1446 1448 1450 1452 1454
0278 0485 0240 0997	44 10	0416 8001	0240 0997			35 44 10 35	0001 SYM 8001 0001	LOO		ARE LAST FOUR CHARACTERS OIGITS)	1456 1458 1460 1462
0679 0535 0641 0589 0399	30 20 10	0001 0536 0294	0641 0589 0399	0536	N OUT		8001 0001 EOUIV XXXX2	ABS	EOUIV	THEY ARE DIGITS. GET VALUE) THEY ARE DIGITS. GET VALUE) STORE THESE 4 OIGITS FIRST CHARACTER INTO UPPER I. ZERO. AOORESS WAS ABSOLUTE	1464 1466 1468 1470 1472
0654 0963						11 46	99 THX	SYM		NON-ZERO. SUBTRACT 90 I. FIRST CHAR IS OIGIT. AOOR SYMBOLIC	1474 1476
0466 0724 0328 0639	46 35	0416 0004	0328 0639				291XX SYM 0004	8003		ADD 29 O, FIRST IS SPEC. CHAR. SYMBOLIC MAKE BRINGING ORDER) MAKE BRINGING ORDER)	1478 1480 1482 1484
0592 0665					J	65 45	G0001	NG		BRING EQUIVALENT OF REGION 1, REGION IS UNDEFINED	1486 1488
0668 0691 1269	16	0515		0536		16	EOUIV 110TH EOUIV	ABS	EOUIV	GET EQUIVALENT OF REGIONAL ADDRESS) GET EQUIVALENT OF REGIONAL ADDRESS) STORE EQUIVALENT	1490 1492 1494
0416 1013 0781	35	8000	0781		N SYM	60 35 44	HSYMB 0008	SHRT		SYMBOLIC ADORESS. BRING SYMBOL CLEAR ALL BUT LAST CHARACTER O, LONG SYMBOL	1496 1498 1500
0585 0741	69 24	0038 0384	0741 0587	0384		69 24	16THX T		т	PRESET T AS POSITIVE 1) PRESET T AS POSITIVE 1)	1502 1504

0727 00 0631 20 0487 69	0184	0487	0184	J	2	00 20 P	0000 0008	SUB13	P0008	ADDEND AND EXIT FOR SUBROUTINE 18 STORE CORE ADDRESS FOR PUNCHING GET DYNAMIC LEVEL OF CORE ADDRESS	1264 12 6 6 1268
0190 00 0344 69 0504 90	1050	0504		J	6	9	0908 1050 B10C			TAGS AND EXIT FOR SUBROUTINE 13 FIRST-CARD TAG D, WE SHOULD STORE THIS DYNAMIC LEVEL	1270 1272 1274
0459 20			0486					SB10C	SAVOR	STORE DYN LEV OF CORE, AND FINISH UP	1276
0376 20 0925 20			0062 0184	N A R CO			PREG 0008	COOOB EXITX		STORE ADDRESS FOR OPTIMIZING NEXT ADDR MISC ADDR. STORE FOR PUNCHING. EXIT	1278 1280
0926 69	0711	0661		N CO	009 6	9 P	RE	SUBR7		STORE EQUIVALENT OF NEW SYMBOL	1282
0927 00	0000	0919		R C00		00	0000	C0002		NEW SYMBOL. BUT'TABLE FULL. N.G.	1284
					HE	D	SUBR	OUTINE 6	PROCE	ESS BACKWARDS I	1286 1288
0142 24 0330 60 1108 69	0153	1108	0177	N SUE	6		XITX 0003 RE	SUBR9	EXITX	STORE EXIT ALPHABETIC*I TO UPPER ANALYZE ALPHABETIC I	1290 1292 1294
0911 65	0536	0371		J PR	: 6	5 E	OUIV	J0004		BRING EOUIVALENT. MULTIBRANCH	1296
0368 69	0911	0661		N J0	001 6	9 P	RE	SUBR7		STORE EQUIVALENT OF NEW SYMBOL	1298
0369 60	0722	0627		R JO	002 6	0 8	9ТНХ	SB10B		N.G. OMIT PUNCHING	1300
0370 69 0772 90				R J00		9 D	RUMT	J0002		BLANK I, IS DRUM FULL D. DRUM IS NOT FULL	1302 1304
0626 65 0371 24 0615 69	0062	0615	0062	N J0	004 2		LANB PREG	J0004 INDEX	OPREG	BRING EOUIVALENT OF BLANK BACKWARD L DRUM OR DRUM EOUIVALENT TO SUBROUTINE 18 TO INDEX	1306 1308 1310
0568 00	0001	0375		J	c	00	0001	J0008		ADDEND AND EXIT FOR SUBROUTINE 18	1312
0372 65	0675	0611		R JO	005 6	5		SUB11		NEW SYMBOL. FIND BEST VALUE	1314
0675 00	0990	0368		J	c	0	0990	J0001		TAGS AND EXIT FOR SUBROUTINE 11	1316
0373 01	0000	0373		R Jo	006	1	0000	J0006		800X RANGE. ERROR.	1318
0374 69	0391	0371		R JO	007 6	9 0	RCEB	J0004		CORE. BRING DYNAMIC LEVEL	1320
0375 20	0185	0177	0185	R J 00	008 2	20 P	0009	EXITX	P0009	OTHER ADDRESS, USUALLY A CONSTANT	1322
					не	D	SUBR	ROUTINE 7	STORE	SYMBOL AND ITS EOUIVALENT	1324 1326
0661 24 0432 65 0439 15 0747 69	0435 0392	0439 0747	0179	N SU	6	5 L 5 S	XITZ SYMB S SYMB	8002	EXITZ	STORE EXIT SYMBOL-STORING ORDER) STORE SYMBOL)	1328 1330 1332 1334
0392 24 0442 65 0489 14	0435	0489	1689	J SS	6	5 L	0001 SYMB DXXX		Z0001	STORE SYMBOL) LOCATION OF EQUIVALENT RELATIVE TO E1 LOCATION OF EQUIVALENT RELATIVE TO E1	1336 1338 1340
1029 35 1039 20	0004	1039	0294		3	35	0004 XXX2		XXXX2	LOCATION OF EQUIVALENT RELATIVE TO E1 LOCATION OF EQUIVALENT RELATIVE TO E1	1342 1344
0797 15 0555 20			0167		1	15 P			XXXX1	MAKE BRINGING ORDER) MAKE BRINGING ORDER)	1346 1348
0670 44 0674 65	0536	0541				4 I	POS OUIV			D. USE I-POSITION. I. USE D-POSITION. BRING EOUIVALENT	1350 1352
0541 35 0451 10						5 10 P	0004	A		SHIFT TO D POSITION MAKE STORING ORDER)	1354 1356
0509 10	0294	0167		CA			XXX2	XXXX1		MAKE STORING ORDER)	1358
1073 65 0591 10				N IP		5 E	3 001V	A		USE I-POSITION. BRING EOUIVALENT MAKE STORING ORDER	1360 1362
1000 69	1555	8003		P P1	6	9 E	0001	8003		INITIAL OF BRINGING ORDER	1364
0554 22	1557	0179	1555	P P2	2	22 E	0001	EXITZ	E0001	INITIAL OF ORDER TO STORE D-POSITION	1366
0394 23	1555	0179	1555	P P3	2	23 E	0001	EXITZ	E0001	INITIAL OF ORDER TO STORE I-POSITION	1368
					HE		SUBF	8 PROCES	SS TYP	E 2 ADDR. ALPH IN UPPER, NUMERIC, LOWR	1370 1372
1024 24	0177	0380	0177	N SU			XITX		EXITX	STORE EXIT	1374

		0254 0412	0559 0613			11 46	115TX	FXT		IS FIRST POSITION BLANK I. FIRST IS NON-BLANK. FIXEO ACCRESS.	1376 1378
0412 0969 0777 0663	60 8	002	0777 0663			10 60 11 46	8001 8002 2000I	RC		RESTORE TO POSITIVE NUMERIC ADORESS ALONE IN UPPER SUBTRACT 2000 0, ORUM. I, CORE.	1380 1382 1384 1386
0366 1123						10 46	OOIFF	840		ORUM. AOO RELOCATION AMOUNT I. RELOCATED ORUM WILL EXCEED 1999	1388 1390
0676	10	0409	0713			10	10001	RES		RESTORE RELOCATED ORUM ADDRESS	1392
0467 1223 0681 0539	10 (0726 0334	0681 0539		N RC		8001 COIFF 9060	8A0		CORE ADDRESS. RESTORE THE 2000 ADD RELOCATION AMOUNT SUBTRACT 9060 I. RELOCATEO CORE ADDRESS TOO HIGH	1394 1396 1398 1400
0542 0713 0720	21 (167	0720	0167	C RES	10 21 69	8001 xxxx1	RES SUB 2R	xxxx1	RESTORE THE 9060 STORE ADORESS TEMPORARILY RESERVE IF DRUM ADORESS	1402 1404 1406
1273	65 (0167	0177		J	65	XXXX1	EXITX		EQUIVALENT BACK TO LOWER AND EXIT	1408
0613	65 8	3002	0177		N FXT	65	8002	EXITX		FIXEO AODRESS. CLEAR UPPER AND EXIT.	1410
0977	60 (0622	0177		N BAO	60	87THX	EXITX		MODIFIED ADDR TOO HIGH. 8000 TO UPPER	1412
0334	00 (0000	9060		K 9060	00	0000	9060			1414
						нЕо	SUBI	ROUTINE 9.	ANAL	YZE AN ADORESS	1416 1418
1002	44	1005	0606		C LOOP	44		UND		I . SYMBOL IS NOT IN THE TABLE	1420
1005 0763 0618	44 (517	0618			44	HSYM8 NZ NZ	DEF		SOME SYMBOL WAS FOUND. SUBTRACT OURS O, IT WAS NOT RIGHT ONE D, IT WAS NOT RIGHT ONE . I, IT AS.	1422 1424 1426
0517 1323 0731	65 8	3002	0731		C NZ	10 65 15	8001 8002 T	8002		WRONG SYMBOL. RESTORE UPPER TO PLUS CLEAR UPPER AOVANCE LOWER AND BRING ANOTHER	1428 1430 1432
0063 0482 0537	45 (0636	0537	0179	N SUBR9	45	EXITZ ABC 110TH	OON	EXITZ	STORE EXIT I, THE ADDRESS IS BLANK MODIFY EXIT AND PREPARE TO OUIT	1434 1436 1438
0636 0961 0629 0947 0604 0913 0567	30 0 21 0 11 8 16 1 46 0	0008 0294 0001 1208 0416 0003	0629 0947 0604 0913 0567 0725	0108	N ABC	30 21 11 16	HSYM8 0008 XXXX2 8001 909 SYM 8003	LOO OUT		ADDRESS NOT BLANK. STORE SYMBOL ALSO STORE FIRST LETTER OF ADDRESS) ALSO STORE FIRST LETTER OF ADDRESS) CLEAR FIRST LETTER SUBTRACT 9090908995 0. ADDRESS IS SYMBOLIC. ARE LAST FOUR CHARACTERS DIGITS) ARE LAST FOUR CHARACTERS DIGITS)	1440 1442 1444 1446 1448 1450 1452 1454
0278 0485 0240 0997	10 8	0416 0001	0240 0997			35 44 10 35	0001 SYM 8001 0001	Loo		ARE LAST FOUR CHARACTERS OIGITS) ARE LAST FOUR CHARACTERS DIGITS) ARE LAST FOUR CHARACTERS OIGITS) ARE LAST FOUR CHARACTERS OIGITS)	1456 1458 1460 1462
0679 0535 0641 0589 0399	30 0 20 0 10 0	0001 0536 0294	0641 0589 0399	0536	N OUT		8001 0001 EOUIV XXXX2	ABS	EOUIV	THEY ARE DIGITS. GET VALUE) THEY ARE DIGITS. GET VALUE) STORE THESE 4 DIGITS FIRST CHARACTER INTO UPPER I. ZERO. ADORESS WAS ABSOLUTE	1464 1466 1468 1470 1472
065 4 0963						11 46	99 THX	SYM		NON-ZERO. SUBTRACT 90 I. FIRST CHAR IS OIGIT. AOOR SYMBOLIC	1474 1476
0466 0724 0328 0639	46 G	0004	0328 0639				291 XX SYM 0004	8003		ADD 29 0. FIRST IS SPEC. CHAR. SYMBOLIC MAKE BRINGING ORDER) MAKE BRINGING ORDER)	1478 1480 1482 1484
0592 0665					J	65 45	G0001	NG		BRING EQUIVALENT OF REGION 1. REGION IS UNDEFINED	1486 1488
0668 0691 1269	16 0	515		0536		16	EOUIV 110TH EOUIV	A8 S	Eoulv	GET EQUIVALENT OF REGIONAL ADORESS) GET EQUIVALENT OF REGIONAL ADORESS) STORE EQUIVALENT	1490 1492 1494
0416 1013 0781	35 (8000	0781		N SYM	60 35 44	HSYM8 0008	SHRT		SYMBOLIC AOORESS. BRING SYMBOL CLEAR ALL BUT LAST CHARACTER O, LONG SYMBOL	1496 1498 1500
0585 0741			0741 0587	0384		69 24	16 THX T		т	PRESET T AS POSITIVE 1) PRESET T AS POSITIVE 1)	1502 1504

1908 1909	0587 65 0290 8001			65 Y	8001		BRINGING ORDER INTO LOWER	1506
1922 1936 0936 0937 0936 0937 0936 0937 0938 0938 0938 0938 0938 0939	0290 10 1689 1002		JY	10 Z0001	LOOP		ADO A SYMBOL INTO UPPER. FROM BOTTOM	1508
1906 10 200 201	0643 20 0384 0637	0384	N SHRT	20 T	8001	т	SHORT. PRESET T AS -1)	1512
0.395 0.495 0.495 0.495 0.495 0.496 0.49	0340 10 1898 1002		J	10 ZMAXM	LOOP		AOD A SYMBOL. STARTING AT TOP	1516
0071 10 0000 0146 N DEF 10 1881 SECTION 0146 N DEF 11 1891 SECTION 0146 N D	0345 20 0435 0588 0588 46 0791 0642 0642 16 0395 0449	0435	N UND	20 LSYMB 46 FULL 16 ZTABL	FULL	LSYMB	STORE AOOR OF SPACE RELATIVE TO START O, TABLE IS FULL	1520 1522 1524
0445 10 0499 0754 0754 02 0459 0754 04 05 05 04 04 04 04 04 04 04 04 04 04 04 04 04	0352 60 0515 1069			60 110TH	DON		MODIFY EXIT. AND PREPARE TO OUIT	1528
1946 1065 67 8001 319 67 8001 R EQUIVALENT IS IN I POSITION OF LOWER 1546	0445 16 0498 0754 0754 20 0435 0638 0638 14 0492 0904 0904 35 0004 0715	0435	N DEF	16 JBRL 20 LSYMB 14 2DXXX 35 0004	8002	LSYMB	SUBTRACT INITIAL BRINGING ORDER ADDRESS OF SYMBOL RELATIVE TO START OIVIDE BY 2 OUOTIENT INTO D OF LOWER	1532 1534 1536 1538
031 67 8001 0721 N LH 67 8001 EQUIVALENT IN 0 POSITION OF LOWER 1546 1319 1			J		LH			
0771 130 0004 1319 C LR	1063 67 8001 1319			67 8001	LR		EQUIVALENT IS IN I POSITION OF LOWER	1546
1219 61 1022 1069 C NG 61 21XXX DON MODIFY EXIT FOR N G SYMBOL 1558 1700 35 0000 0779 1800 0779 18 1080 0779 1800 0779 18 1080 0779 1800 0779 18 1080 0779 1800 0779 18 1080 0779 1800 0779 18 1080 0779 1800 0779 18 1080 0779 1800 0779 18 1080 0779 1800 0779 18 1080 0779 1800 0779 18 1080 0779 1800 0779 18 1080 0779 1800 0779 18 1080 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 0779 1800 0779 1800 0779 0779 1800 0779 0779 1800 0779 1800 0779 0779 1800 0779 0779 1800 07	0721 30 0004 1319 1319 69 8003 0776	0536		30 0004 69 8003		EOUIV	EOUIVALENT IN I POSITION OF LOWER CLEAR OISTRIBUTOR	1550 1552
16 8002 0729 16 8002 30 0006 38 84 1200 3802 3								
0605 35 0006 0970 35 0006 0070 35 0006 000 SHIFT TO REMOVE TABULAR ADDRESS) 1570 1069 10 0179 8003 C DON 10 EXITZ 8003 FROM MANY PLACES. MULTIBRANCH 1574 1574 1574 1576 1069 10 0179 8003 C DON 10 EXITZ 8003 FROM MANY PLACES. MULTIBRANCH 1574 1576 1576 1576 1576 1576 1576 1576 1576	0770 16 8002 0729 0729 84 1200 0775		N ABS	16 8002 84 1200	8002		ADDRESS INTO LEFT END DISTRIBUTOR SEARCH TABLE ACCORDING TO SIZE OF ADDR	1562 1564
SUBROUTINE 10. MISCELLANEOUS EXITS 1578 0001 60 0003 0709	0605 35 0006 0970 0970 30 0006 1069		C DON	35 0006 30 0006			SHIFT TO REMOVE TABULAR ADDRESS) SHIFT TO REMOVE TABULAR ADDRESS)	1570 1572
0001 60 0003 0709	1208 90 9090 8995		K 909	90 9090	8995			1576
0001 60 0003 0709								
1582 1044 0499 C SUB10 15 815TX C 1. TO PUNCH X = 9 1582 1584 1585 1585 1582 1027 1027 1077 8003 1584 159005 1584 159005 1584 159005 1584 159005 1584 159005 1584 159005 1584 159005 1584 159005 1584 159005 1584 159005 1584 159005 15902 169005				SUE	BROUTINE 10	• MISO	CELLANEOUS EXITS	1578
0941 21 0154 0759 0154	0709 15 1044 0499 0499 20 0186 0689 0689 60 8003 0057 0057 15 0181 0635 0635 15 1022 1027 1027 20 0181 0434		C SUB10	15 815TX 20 P0010 60 8003 15 P0005 15 2IXXX 20 P0005	SB10A		C.I. TO PUNCH X-9) C.I. TO PUNCH X-9) CLEAR LOWER AOVANCE CARO NUMBER) AOVANCE CARO NUMBER) AOVANCE CARO NUMBER)	1582 1584 1586 1588 1590 1592
SUBROUTINE 11. FIND BEST LOCATION AND RESERVE IT 1604 1606 1609 1609 1072 N SUB11 69 DRUMT FAKT FAMILY STORE EXITY STORE EXIT OUT OF LOWER 1610 1614 1608 1610 1614 1616 16	0941 21 0154 0759		N 5B10B	21 R0004	FYITY	R0004	TO SUPPRESS IN CASE WE SEARCH	1598
SUBROUTINE 11. FINO BEST LOCATION AND RESERVE IT 1604 1606 0611 69 1669 1072 N SUB11 69 DRUMT IS THE ORUM FULL 1608 1072 90 0976 1077 PAKT IS THE ORUM FULL 1610 0976 20 0178 0931 0178 20 EXITY EXITY STORE EXIT OUT OF LOWER 1610 0978 65 8003 0693 96 DI 1. ADDRESS IS BACKWARD I OR FORWARD L 1614 0736 65 8003 0693 SSW CLEAR ACCUMULATOR AND JUMP 1616 0484 69 0687 0390 N DI 69 F PRPARE EXIT AND GO TO SUBROUTINE 13 1618 0390 22 0167 0441 0167 22 XXXX1 SUB13 XXXX1 PREPARE EXIT AND GO TO SUBROUTINE 13 1620 0687 00 0000 0991 J F 00 0000 TO BUILD EXIT FROM SUBROUTINE 13 1622 0991 35 0004 0501 35 0004 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1624 0501 15 8002 0693 15 8002 0693 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1626			N SB10C					
HED 0611 69 1669 1072 N SUB11 69 DRUMT IS THE ORUM FULL 1608 1072 90 0976 1077 PAKT IS THE ORUM FULL 1. YES. 1610 0976 20 0178 0931 0178 20 EXITY EXITY STORE EXIT OUT OF LOWER 1610 0978 65 8003 0693 96 DI 1. ADDRESS IS BACKWARD I OR FORWARD L 1614 0736 65 8003 0693 SSW CLEAR ACCUMULATOR AND JUMP 1616 0484 69 0687 0390 N DI 69 F PREPARE EXIT AND GO TO SUBROUTINE 13 1618 0390 22 0167 0441 0167 22 XXXX1 SUB13 XXXX1 PREPARE EXIT AND GO TO SUBROUTINE 13 1620 0687 00 0000 0991 J F 00 0000 TO BUILD EXIT FROM SUBROUTINE 13 1622 0991 35 0004 0501 35 0004 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1624 0501 15 8002 0693 15 8002 SSW 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1626								
0611 69 1669 1072 N SUB11 69 DRUMT IS THE ORUM FULL 1608 1072 90 0976 1077 PAKT I. YES. 1610 0976 20 0178 0931 0178 20 EXITY EXITY STORE EXIT OUT OF LOWER 1612 0931 96 0484 0736 96 DI I. ADDRESS IS BACKMARO I OR FORWARO L 1614 0736 65 8003 0693 65 8003 SSW CLEAR ACCUMULATOR AND JUMP 1616 0484 69 0687 0390 N DI 69 F SUXXXX1 SUB13 XXXXX1 PREPARE EXIT AND GO TO SUBROUTINE 13 1620 0487 00 0000 0991 J F 00 0000 TO BUILD EXIT FROM SUBROUTINE 13 1620 0687 00 0000 0991 J F 00 0000 TO BUILD EXIT FROM SUBROUTINE 13 1622 0991 35 0004 0501 35 0004 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1624 0501 15 8002 0999 15 8002 0693 15 8002 SSW 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1628					ROUTINE 11	• FIN	D BEST LOCATION AND RESERVE IT	
1072 90 0976 1077 90 PAKT I. YES. 1610 0976 20 0178 0931 0178 20 EXITY EXITY STORE EXIT OUT OF LOWER 1612 0931 96 0484 0736 96 DI 1. ADDRESS IS BACKWARD I OR FORWARD L 1616 0736 65 8003 0693 65 8003 SSW CLEAR ACCUMULATOR AND JUMP 1616 0484 69 0687 0390 N DI 69 F PREPARE EXIT AND GO TO SUBROUTINE 13 1618 0390 22 0167 0441 0167 22 XXXX1 SUB13 XXXX1 PREPARE EXIT AND GO TO SUBROUTINE 13 1620 0687 00 0000 0991 J F 00 0000 TO BUILD EXIT FROM SUBROUTINE 13 1622 0991 35 0004 0501 35 0004 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1624 0501 15 8002 0909 15 8002 0693 15 8002 SSW 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1626								
0931 96 0484 0736 96 DI I ADDRESS IS BACKMARO I OR FORWARO L 1614 0736 65 8003 0693 65 8003 SSW CLEAR ACCUMULATOR AND JUMP 1616 0444 69 0687 0390 N DI 69 F PREPARE EXIT AND GO TO SUBROUTINE 13 1620 0687 00 0000 0991 J F 00 0000 TO BUILD EXIT FROM SUBROUTINE 13 1620 0991 35 0004 0501 35 0004 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1624 0501 15 8002 0999 15 8002 0693 15 8002 SSW 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1626			N SUBII		PAKT		I. YES.	
0390 22 0167 0441 0167 22 XXXX1 SUB13 XXXX1 PREPARE EXIT AND GO TO SUBROUTINE 13) 1620 0687 00 0000 0991	0931 96 0484 0736	0178		96 DI	SSW	EXITY	I. ADORESS IS BACKWARO I OR FORWARO L	1614
0991 35 0004 0501 35 0004 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1624 0501 15 8002 0909 15 8002 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1626 0909 15 8002 0693 15 8002 SSW 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 1628		0167	N DI		SUB13	xxxx1		
	0991 35 0004 0501 0501 15 8002 0909 0909 15 8002 0693			35 0004 15 8002 15 8002	SSW		4 TIMES OYNAMIC ADDRESS IN 0 POSITION 4 TIMES OYNAMIC ADDRESS IN 0 POSITION 4 TIMES OYNAMIC ADDRESS IN D POSITION	1624 1626 1628

0981 97 0534 0786		97	BAK		0+ FORWARO. I. BACKWARO.	1632
0534 69 0737 0440	0742	69 OFF 24 SW		SW	FORWARO. SET SWITCH OFF FOR 1ST PART FORWARO. SET SWITCH OFF FOR 1ST PART	1634
0440 24 0743 0296 0296 15 0549 0954	0743	15 601			INITIAL OF VARIABLE BRINGING OROER	1636 1638
0954 20 0959 0462 0462 16 0038 0793	0959	20 BP1 16 16THX	ST	BP1	STORE VARIABLE BRINGING OROER COMPARISON CONSTANT FOR LAST PART	1640 1642
1088 44 1241 0743 0743 65 0346 0551	R TA SW	44 YES 65 AI	SW SWOF		IS A LOCATION AVAILABLE IN THIS GROUP NOT PERFORMEDJUST FOR OPTIMIZING	1644 1646
0737 65 0346 0551 0551 16 1054 1009	J OFF SWOF	65 AI 16 799	SWOF		HAVE WE REACHED TOP OF TABLE SUBTRACT END OF TABLE	1648 1650
1009 45 0512 1113	3#0.	45	MAX		I. WE HAVE REACHED TOP OF TABLE	1652
0512 15 0765 1020 1020 20 0346 8001	0346 C SAI	15 800 20 AI	SAI 8001	ΑI	AOVANCE VARIABLE BRINGING OROER STORE BRINGING OROER, AND OO IT	1654 1656
0786 69 0739 0692 0692 24 0743 0396	N BAK 0743	69 OFB 24 SW		SW	GOING BACKWARO. SET SWITCH OFF) GOING BACKWARO. SET SWITCH OFF)	1658 1660
0396 15 0599 1104 1104 20 0959 0562	0959	15 602 20 BP1		BP1	INITIAL BRINGING OROER) INITIAL BRINGING OROER)	1662 1664
0562 15 0038 0793 0793 20 1097 1020	1097 C ST	15 16THX 20 A0	ST SAI	AO	COMPARISON CONSTANT FOR LAST PART STORE COMPARISON CONSTANT	1666 1668
0739 65 0346 0601	J OFB	65 AI			START BACKWAROS SEARCH. HOW FAR	1670
0601 16 1354 1059 1059 45 0612 1213		16 600 45	MIN		SUBTRACT COMPARISON CONSTANT 0. WE ARE NOT BACK TO START YET	1672 1674
0612 15 0915 1020		15 599	SAI		RESTORE AND MODIFY	1676
1113 69 0516 1070 1070 24 0743 0446	N MAX 0743	69 ON 24 SW		SW	AT TOP. SET SWITCH ON) AT TOP. SET SWITCH ON)	1678 1680
0446 65 1354 1020		65 600	SAI		RESET BRINGING OROER. AND SEARCH MORE	1682
0516 65 0346 0651 0651 16 1097 0701	J ON	65 AI 16 AO			AFTER RESTART. BRING BRINGING ORDER COMPARISON CONSTANT. SUBTRACTED	1684 1686
0701 45 0655 0705		45	FULL		I. THERE IS NO AVAILABLE LOCATION.	1688
0655 15 0959 1020		15 BP1	SAI		RESTORE AND MODIFY	1690
1213 69 0516 1120 1120 24 0743 0496 0496 65 1054 1020	N MIN 0743	69 ON 24 SW 65 799	SAI	SW	SECONO PART: BACKWAROS: CHANGE SWITCH SECONO PART: BACKWAROS: CHANGE SWITCH START BACK FROM TOP OF TABLE	1692 1694 16 9 6
0705 01 0222 1109 1109 69 0114 0617	N FULL	01 0222 69 915TX			STOP BECAUSE ORUM IS PACKED	1698
0617 24 1669 1122	1669	24 ORUMT		ORUMT	CHANGE ORUM TAG TO 9) CHANGE ORUM TAG TO 9)	1700 1702
1122 65 0178 1077 1077 15 0515 8002	C PAKT	65 EXITY 15 110TH	PAKT 8002		MOOIFY EXIT)	1704 1706
1241 36 0000 1263 1263 20 0294 1247	N YES	36 0000 20 XXXX2		****	WE FOUND A CELL. SHIFT AND COUNT STORE THE COUNT	1708 1710
1247 69 0197 1100	02,74	69 ALOPT		20006	SHOULO WE RESERVE	1712
1100 90 0755 0905 0905 35 0001 1011		90 SKP 35 0001			0, SKIP BECAUSE COMP IS OOUBLE RESERVE)	1714 1716
1011 30 0001 0667 0667 11 8003 0975		30 0001 11 8003			RESERVE) PUT INTO DISTRIBUTOR	1718 1720
0975 35 0004 0685 0685 10 8001 1291		35 0004 10 8001			MOVE AMOUNT OF SHIFT INTO O AVAILABILITY WORD BACK INTO UPPER	1722 1724
1291 15 0444 8002		15	8002		MAKE SHIFTING OROER	1726
0444 30 0000 0717 0717 60 8003 1225	J	30 0000 60 8003			SHIFT MODIFIED WORD BACK INTO PLACE CLEAR LOWER	1 72 8 1 73 0
1225 15 0346 0751 0751 69 0955 1209		15 AI 69 STR			NEW AVAILABILITY WORD INTO ORUM) NEW AVAILABILITY WORD INTO ORUM)	1732 1734
1209 22 0167 8001	0167	22 XXXX1	8001	XXXX1	NEW AVAILABILITY WORD INTO ORUM)	1736
0955 21 9972 0755 0755 65 0346 0951	9972 J STR C SKP	21 9972 65 AI	SKP	9972	NEW AVAILABILITY WORD INTO ORUM) ALL CASES. WHAT DID WE RESERVE)	1 73 8 1 74 0
0951 16 1354 1309 1309 30 0004 1220		16 600 30 0004			WHAT CELL OIO WE RESERVE) WHAT CELL OIO WE RESERVE)	1742 1744
1220 14 0774 1021 1021 16 8002 1079		14 4IXXX 16 8002			WHAT CELL OIO WE RESERVE) WHAT CELL OIO WE RESERVE)	1746 1748
1079 35 0001 1035		35 0001			WHAT CELL OIO WE RESERVE)	1750
1035 15 8001 1341 1341 10 0294 0649		15 8001 10 XXXX2			WHAT CELL OIO WE RESERVE)	1752 1754
0649 19 0320 1074 1074 15 8003 1031		19 50 IXX 15 8003	FULF	Fa	WHAT CELL OIO WE RESERVE) WHAT CELL OIO WE RESERVE)	1756 1758
	0536	20 EQUIV	EXITY	FOULV	STORE THIS ADORESS IN EQUIV	1760
0915 60 1354 1088	Q 599	60 A0000	TA	•		1762
1354 60 1355 1088	0 600 B 601	60 A0001	TA			1764
0549 60 1356 1088	P 601	60 A0002	TA			1766
0599 60 1357 1088	P 602	60 A0003	TA			1768
1054 60 1554 1088	Q 799	60 A0200	TA			1770
0765 60 1555 1088	Q 800	60 A0201	TA			1772

	HEO SUBROUTINE 13. CALCULATE OPTIMUM DYNAMIC	LEVEL 1774 1776
0441 24 0179 0532 0179 N SUB13 0532 95 0735 0787	24 EXITZ EXITZ STORE EXIT 95 9 D. O AOORESS. I. FORW	1778 ARO I OR BACKW L 1780
0735 97 0688 0490	97 FD FIBO D, FORWARD D. I, BAG	KWARO D. 1782
0787 97 0490 0742 N 9	97 FIBD BL 0, FORWARO I. I, BACK	WARD L. 1784
0688 65 0095 0699 N FO 0699 35 0001 1055 1055 16 8002 1313 1313 35 0001 1270 1270 15 8001 1227 1227 30 0003 0785	65 OPTIM FORWARO 0 L-D ADDENU 35 0001 L-O AODENOS TO LE 16 8002 L-O ADDENOS TO LE 35 0001 L-O ADDENOS TO LE 15 8001 L-D AODENOS TO LE 30 0003 SEO L-O ADDENDS TO LE	FT END LOWER) 1788 FT END LOWER) 1790 FT END LOWER) 1792 FT END LOWER) 1794
0490 65 0095 0749 N FIBD 0749 92 0402 1105 1105 93 0660 0710 0710 35 0002 0785	65 OPTIM FORWARD I OR BACKWARD 92 SHOP 0. IT IS A SHIFT OF 93 XAS 0. IT IS AN INDEXIS 35 0002 SEO OTHER. I-ADDENOS	
0742 65 0197 1051 N BL 1051 92 0402 0656 0656 93 0660 1061 1061 91 0364 0688	65 ALOPT BACKWARO L. GET ALOP 92 SHOP D. IT IS A SHIFT OF 93 XAS 0. IT IS AN INDEXIF 91 FD 0. IT IS AN BRANCH OF	PERATION 1808 IG OPERATION 1810
0364 99 0688 0490	99 FO F1BD I. BACKWARD L. BRANCH	UNFIXED O 1814
0402 60 0184 0789 N SHOP 0789 35 0009 0760 0760 30 0005 0974 0974 10 1277 8003	60 P0008 SHIFT OPERATION. FORM 35 0009 ISOLATE LAST DIGIT OF 30 0005 ISOLATE LAST DIGIT OF 10 8003 MAKE BRINGING ORDER	ARD I, BACKW L. 1816 D-AODRESS 1818 O-ADDRESS 1820 1822
1277 65 1250 0706 J 0706 69 0095 0548 0548 93 1101 0785	65 1250 BRING SHIFT ADDENOS 69 OPTIM OPTIMIZING TAGS 93 SEO D. OPERATION 31. 1.	1824 1826 10,35,36. 1828
1101 35 0004 0785	35 0004 SEO OPERATION 31. TAKE LA	RGER ADDENDS. 1830
0660 60 0184 0939 N XAS 0939 30 0004 0799 0799 16 8002 0910 0910 84 1300 1275 1275 15 0428 8002	60 P0008 INDEXING OP, FORWARD 30 0004 0-A00RESS TO LEFT END 16 8002 0-ADDRESS TO LEFT END 84 1300 LOOK UP IN TABLE 15 8002 MAKE BRINGING ORDER	I, BACKWARD L. 1832 OF OISTR) 1834 OF DISTR) 1836 1838 1840
0428 65 0000 0756 J 0756 35 0004 0767 0767 92 0785 1222 1222 16 0095 0785 0785 69 0179 0582 C SE0 0582 97 0935 0937 0937 20 0792 0495 0792 0495 30 0006 0960 0960 35 0008 0779 0779 20 0733 0936 0733 0936 60 8003 0943 0943 30 0002 0949 0949 20 0906 1010 010 15 0733 0987 0987 15 0132 1037 1037 14 0540 1088 1048 44 1351 1052 1052 66 0906 1111 1111 30 0002 0917 0917 16 0733 0935	65 0000 35 0004 35 0004 36 SHIFT AODENDS TO LEFT 36 PEXITZ 36 PEXITZ 37 P 30 0006 37 0006 38 HOLLO WE INTERCHAI 30 0006 35 0008 30 0006 30 SHOULD WE INTERCHAI 30 0002 30 0002 30 0002 30 0002 30 0002 31 SHOULD WE INTERCHAI 30 0002 32 SHOULD WE INTERCHAI 34 SHOULD WE INTERCHAI 35 SHOULD WE INTERCHAI 36 SHOULD WE INTERCHAI 37 SHOULD WE INTERCHAI 38 SHOULD WE INTERCHAI 39 SHOULD WE INTERCHAI 30 SHOULD WE INTERCHAI 30 SHOULD WE INTERCHAI 31 SHOULD WE INTERCHAI 32 SHOULD WE INTERCHAI 33 SHOULD WE INTERCHAI 34 SHOULD WE INTERCHAI 35 SHOULD WE INTERCHAI 36 INTERCHAIGE AND MAKE I	NRD 1852 1852 1854 1854 1854 1855 1856 1
1320 65 0062 0967 0967 14 1022 1060 1060 44 1014 0414 1014 65 0167 0771	66 IND P MAKE NEGATIVE, BUT 00 20 XXXX1 XXX1 ALL CASES. STORE A001 65 OPREG WHICH ONE 00 WE USE 1 14 21XXX WHICH ONE 00 WE USE 1 44 EVN 0, OPREG WAS 00D. I, 65 XXXX1 ODD. SEPARATE LAST A1 35 0002 000. SEPARATE LAST A1	EVEN • 1890 DENO) 1892
0771 35 0002 1327 1327 65 8002 0985	65 8002 BOTH 000 SEPARATE LAST AG	
0414 65 0167 0985 N EVN 0985 30 0008 0956 C BOTH 0956 15 0062 1017 1017 15 0320 1325 1325 69 0179 0632 0632 95 1085 1087 1087 97 1085 0942 0942 16 0545 1085 1085 14 0320 1272 C CP 1272 65 8003 0179	65 XXXX1 BOTH EVEN. WE SHOULO USE I 30 0008 BOTH. RIGHT AOOENO TO 15 OPREG ADD OLO DYNAMIC LEVEL 15 501XX ADD 50 TO MAKE SURELY 69 EXITZ IF BACKWARO L, SUBTRAY 97 CP IF BACKWARO L, SUBTRAY 16 COUNT CP IF BACKWARO L, SUBTRAY 14 501XX NEW LEVEL. MOOULO 50 16 8003 EXITZ NEW OYNAMIC LEVEL INTO	RIGHT ENO 1900 1902 1902 1902 1904 1904 1904 1904 1904 1906 19
0540 04 0000 0000 K 42ND	04 0000 0000	1918

				BROUTINE 1	4. CON	TROL INFO. OP. OPTIM. ALOPT.	1920
0039 24 0177 0430	0177	N SUB14	HED 24 EXITX		EVITV	STORE EXIT	1922
0430 69 0154 1110 1110 24 0186 0989 0989 65 0155 1210	0186	N 30014	69 R0004 24 P0010 65 R0005			CONTROL INFORMATION FOR PUNCHING) CONTROL INFORMATION FOR PUNCHING) BRING TAGS AND OPERATION	1926 1928 1930
1210 69 8003 0566 0566 22 0183 0986 0986 16 8001 0993	0183		69 8003 22 P0007 16 8001		P0007	CLEAR DISTRIBUTOR STORE OPERATION FOR PUNCHING CLEAR OP FROM ACCUMULATOR	1932 1934 1936
0993 35 0005 1006 1006 21 0902 1056	0902		35 0005 21 0902		0902	D TAG INTO UPPER STORE D TAG	1938 1940
1056 65 8002 0965 0965 30 0005 0628 0628 20 0903 1106	0903		65 8002 30 0005 20 0903		0903	DELETE D TAG TAG TO RIGHT END LOWER STORE I TAG	1942 1944 1946
1106 45 1260 1211	0,05		45	вт	0,03	D. I TAG IS NON-ZERO	1948
1260 65 0515 1211 1211 10 0902 1310 1310 44 0464 0514		с вт	65 110TH 10 0902 44	BT UM		COUNT OF I TAGS IN LOWER D TAG INTO UPPER O, D TAG IS NON-ZERO	1950 1952 1954
0464 15 0515 0514 0514 20 0545 0598	0545	C UM	15 110TH 20 COUNT	UM	COUNT	COUNT OF TAGS IN LOWER STORE TAG-COUNT	195 6 1958
0598 60 0183 1237 1237 10 0590 8003			60 P0007 10	8003		OPERATION IN D OF UPPER MAKE BRINGING ORDER	1960 19 6 2
0590 65 0800 1306 1306 24 0095 0648	0095	J	65 0800 24 OPTIM		OPTIM	BRING OPTIMIZING ADDENOS AND TAGS STORE OPTIMIZING ADDENDS AND TAGS	1964 1966
0648 69 8003 1261 1261 23 0167 0971	0167		69 8003 23 XXXX1		XXXX1	CLEAR DISTRIBUTOR STORE LAST & DIGITS OF OPTIM	1968 1970
0971 35 0001 0678 0678 44 1081 0682 0682 60 1235 1089			35 0001 44 YES 60 8	AX		ONE DIGIT INTO UPPER I, O IS NOT TRUE ADDRESS MORE TAGS INTO UPPER	1972 1974 1976
1081 60 0584 1089		N YES	60 9	AX		MORE TAGS INTO UPPER	1978
1089 10 0167 1071 1071 21 0197 0177	0197	CAX	10 XXXX1 21 ALOPT	EXITX	ALOPT	AOD IN TAGS FROM OPTIM STORE ALL OPTIMIZING TAGS	1980 1982
1235 98 8008 0000 0584 98 8009 0000		K 8 K 9	98 8008 98 8009	0000			1984 1986
			HED	BROUTINE 1	7. MOO	IFY DYN LEV IF D = 8001,8002,8003	1988 1990
0586 24 0178 1231 1231 20 0294 1297 1297 14 1022 1322	0178 0294	N SUB17	24 EXITY 20 XXXX2 14 2IXXX	Eva:		STORE EXIT INSTRUCTION STORE DYNAMIC LEVEL, RIGHT END WORD DIVIDE DYNAMIC LEVEL BY 2	1992 1994 1996
1322 44 1076 1026 1076 65 1279 1033			65 8002	EVN E0		D. DYNAMIC LEVEL IS ODD. ODD. PUT 8002 AT RIGHT END OF LOWER	1998
1026 65 1229 1033		N EVN	65 8003	Eo		EVEN. PUT 8003 AT RIGHT END OF LOWER	2002
1033 16 0536 0992 0992 24 0184 1287 1287 45 0640 1042	0184	C EO	16 EQUIV 24 P0008 45 XY		P0008	BOTH. SUBTRACT THE 800X ADDRESS STORE THE ADDRESS FOR PUNCHING 1, 8002-8003 + WRONG PARITY	2004 2006 2008
1042 65 0515 0178			65 110TH	EXITY		UNIT CORRECTION TO DYNAMIC LEVEL	2010
0640 65 1043 1347 1347 16 0536 1092 1092 45 0546 0698 0698 66 0515 0178		N XY	65 8001 16 EQUIV 45 NZ 66 110TH	EXITY		8001 INTO RIGHT END LOWER SUBTRACT THE AODRESS IN QUESTION D. AODRESS IS NOT 8001 F. 8001, CORRECTION IS -1	2012 2014 2016 2018
0546 67 8003 0178		N NZ	67 8003	EXITY		IF NOT 8001, CORRECTION IS ZERO	2020
1043 00 0000 8001 1279 00 0000 8002		K 8001 K 8002	00 0000	8001 8002			2022 2024
1229 00 0000 8003		K 8003	00 0000	8003			2026
			HED	BROUTINE 1		EX FOR USE WITH INDEXING REGISTER	2028 2030
0677 24 0178 1281 1281 20 0167 1121 1121 65 0178 0783	0178 0167	N INDEX	24 EXITY 20 XXXX1 65 EXITY			STORE EXIT STORE ADORESS D-POSITION HOLDS 0 FOR 0, 1 FOR I)	2032 2034 2036
0783 30 0004 1093 1093 35 0004 1311 1311 15 0564 8002			30 0004 35 0004 15	8002		D-POSITION HOLOS O FOR D, 1 FOR I) D-POSITION HOLOS O FOR D, 1 FOR I) BRINGING ORDER	2038 2040 2042
0564 65 0902 0662 0662 15 8002 1221		J	65 0902 15 8002			BRING APPROPRIATE TAG	2044
1221 10 0167 1271 1271 11 1124 0929	-		15 8002 10 XXXX1 11 27TH			DOUBLE IT INDEXABLE ADDRESS INTO UPPER SUBTRACT 2000, TO DETERMINE RANGE	2046 2048 2050
0929 46 0732 0933 0933 11 8003 1242			46 DRM 11 8003			I + CORE + D + DRUM + CORE + CLEAR UPPER	2052 2054
1242 30 0001 0999			30 0001	Α		SH1FT RIGHT FOR CORE ADDENO	2056

				0999 0178		C	DRM A	10 15	8001 XXXX1	EXITY		DRUM. MAKE POSITIVE AGAIN ADD ADDRESS BEING INDEXED. EXIT.	2058 2060
112	24 0	00	0000	2000		K	2 7 TH	00	0000	2000		FOR TELLING WHETHER DRUM OR CORE	2062
								HED	SUB	ROUTINE 19	PRO	CESS L FORWARD	20 64 206 6
				0480 0712	0177	N	SUB19		EXITX RODO1		EXITX	STORE EXIT ALPHABETICAL L TO UPPER	2068 2070
07:	12 6	59	1015	0063				69	PRE	SUBR9		ANALYZE L-ADORESS	2072
				0421			PRE		EQUIV	L0004		BRING EOUIVALENT. MULTIBRANCH	2074
				0661			L0001	69	PRE	SUBR7		SUB 11 FOUND EOU OF SYMB. RESERVE	2076
				0627		R	L0002	60	87THX	SB10B		N.G. FIX TO OMIT PUNCHING	2078
				1224 0419		R	L0003	69 90	DRUMT	L0002		BLANK ADDRESS. IS DRUM FULL D. DRUM NOT FULL. I. DRUM IS FULL.	2080 2082
128	21 2	20 1	0182 8001	0421 1285 1292 1025	0182	N	L0004		BLANK P0006 8001	L0004 SUB2R	P0006	USE PROPER VALUE FOR BLANK ADDRESS DRUM. STORE ADDRESS FOR PUNCHING PUT IT INTO UPPER RESERVE ADDRESS	2084 208 6 2088 2090
				1337					P0006	MW		BRING BACK NUMERICAL ADDRESS	2092
098	33 9	90	1001	0983 0738 0611		R	L0005	69 90 65	1030 MDFLL	SUB11		NEW SYMBOL. WHERE ARE WE D. START SEARCH. I. WE ARE ON OUITT FIND AN EOUIVALENT	2094 2096 2098
134	42 0	00 (0890	0418		J		00	0890	L0001		TAGS AND EXIT FOR USE IN SUBR 11	2100
042	23 0	00 1	0000	0001		R	L0006	00	0000	SETCC		800X AODRESS. OUIT IMMEDIATELY	2102
133	35 6	55	0292	1335 1337 0335	0182		L0007	65	P0006 ORCEO COUNT	MW SB10C	P0006	CORE ADDRESS. STORE FOR PUNCHING DYNAMIC LEVEL OF LAST CORE ADDRESS CORE OR DRUM. ADD TAG-COUNT TO DYN LV	2104 2106 2108
042	25 0	00	0000	0419		R	L0008	00	0000	L0002		MISCELLANEOUS ADDRESS. OUIT AND OMIT	2110
								HED	SUB	BROUTINE 20	D. PRO	CESS D FORWARD	2112 2114
063	30 6	50	0152	0630 0762 0063	0177	N	SUB20	24 60	SUB EXITX R0002 PRE	SUBR9		ESS D FORWARD STORE EXIT ALPHABETICAL D INTO UPPER ANALYZE D-ADDRESS	
063	30 6 52 6	59	0152 1065	0762	0177		SUB20	24 60 69	EXITX R0002			STORE EXIT ALPHARETICAL D INTO UPPER	2114 2116 2118
06:	30 6 52 6 55 6	50	0152 1065 0536	0762 0063	0177	J		24 60 69	EXITX R0002 PRE	SUBR9	EXITX	STORE EXIT ALPHABETICAL D INTO UPPER ANALYZE D-ADDRESS	2114 2116 2118 2120
06: 076 106	30 6 52 6 55 6 59 2	59	0152 1065 0536 1023	0762 0063 0472		N	PRE	24 60 69 65 20	EXITX R0002 PRE EOUIV	SUBR9 D0004	EXITX	STORE EXIT ALPHABETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH	2114 2116 2118 2120 2122
063 076 106 046 047	30 6 52 6 55 6 55 6 70 6 71 6 48 9	50 55 55 50 50 50 50 50 50 50 50 50 50 5	0152 1065 0536 1023 0672 0095 0800	0762 0063 0472 0476		J N R	PRE D0001	24 60 69 65 20	EXITX R0002 PRE EOUIV BLANK	SUBR9 D0004 D0008	EXITX	STORE EXIT ALPHARETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE	2114 2116 2118 2120 2122 2124
065 076 106 046 047 077 095	30 6 52 6 55 6 59 2 70 6 71 6 48 9	50 659 659 655	0152 1065 0536 1023 0672 0095 0800 1115	0762 0063 0472 0476 0627 0748 0912		J N R	PRE D0001 D0002	24 60 69 65 20 60 69 94	EXITX R0002 PRE EOUIV BLANK 88THX OPTIM	SUBR9 D0004 D0008 SB10B	EXITX	STORE EXIT ALPHABETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MDF OPERATION IF BLANK D AND MDF, STOP MACHINE	2114 2116 2118 2120 2122 2124 2126 2128 2130
065 076 106 046 047 077 095	30 6 52 6 55 6 59 2 70 6 71 6 48 9 12 6	50 65 65 65 65 65 65 65 65 65 65 65 65 65	0152 1065 0536 1023 0672 0095 0800 1115 0888	0762 0063 0472 0476 0627 0748 0912 0611		J N R R	PRE D0001 D0002	24 60 69 65 20 60 69 94 65	EXITX R0002 PRE EOUIV BLANK 88THX OPTIM 0800	SUBR9 D0004 D0008 SB10B	EXITX	STORE EXIT ALPHABETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MDF OPERATION IF BLANK D AND MDF. STOP MACHINE BLANK D. BUT NOT MDF. FIND VALUE OF D	2114 2116 2118 2120 2122 2124 2126 2128 2130 2132
06: 076 106 046 047 077 077 11:	30 6 52 6 55 6 59 2 70 6 71 6 12 6 72 6	559 555 555 555 555 555 555 555 555 555	0152 1065 0536 1023 0672 0095 0800 1115 0888 1226	0762 0063 0472 0476 0627 0748 0912 0611 0469		J N R R	PRE D0001 D0002 D0003	24 60 69 65 20 60 69 94 65	EXITX R0002 PRE EOUIV BLANK 88THX OPTIM 0800	SUBR9 D0004 D0008 SB10B SUB11 D0001	EXITX	STORE EXIT ALPHABETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MDF OPERATION IF BLANK D AND MDF. STOP MACHINE BLANK D. BUT NOT MDF. FIND VALUE OF D TAGS AND EXIT FOR SUBROUTINE 11	2114 2116 2118 2120 2122 2124 2126 2130 2132 2134
06: 076 046 04: 04: 077 09: 11: 04:	330 6 552 6 555 6 559 2 70 6 71 6 71 6 71 6 71 6 71 6	555 1 220 550 1 559 1 5 555 5 5 5 5 5 5 5 5 5 5 5 5 5	0152 1065 0536 1023 0672 0095 0800 1115 0888 1226	0762 0063 0472 0476 0627 0748 0912 0611 0469 0677		J N R R J N	PRE D0001 D0002 D0003	24 60 69 65 20 60 69 94 65 00	EXITX ROOO2 PRE EOUIV BLANK 68THX OPTIM 0800	SUBR9 D0004 D0008 SB10B SUB11 D0001 INDEX	EXITX	STORE EXIT ALPHABETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MDF OPERATION IF BLANK D AND MDF. STOP MACHINE BLANK D. BUT NOT MDF. FIND VALUE OF D TAGS AND EXIT FOR SUBROUTINE 11 DRUM ADDRESS. INDEX IF TAGGED	2114 2116 2118 2120 2122 2124 2126 2128 2130 2132 2134 2136
06: 076 106 046 047 077 09: 11: 047	330 6 552 6 555 6 770 6 771 6 771 6 772 6 772 6	555 555 555 555 555 555 555 555 555 55	0152 1065 0536 1023 0672 0095 0800 1115 0888 1226 0000	0762 0063 0472 0476 0627 0748 0912 0611 0469 0677		J N R R J N	PRE D0001 D0002 D0003	24 60 69 65 20 60 69 94 65 00	EXITX ROOO2 PRE EOUIV BLANK 68THX OPTIM 0800	SUBR9 D0004 D0008 SB10B SUB11 D0001 INDEX D0008	EXITX	STORE EXIT ALPHARETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MDF OPERATION IF BLANK D AND MDF, STOP MACHINE BLANK D. BUT NOT MDF. FIND VALUE OF D TAGS AND EXIT FOR SUBROUTINE 11 DRUM ADDRESS. INDEX IF TAGGED ADDEND AND EXIT FOR USE IN SUBR 18	2114 2116 2118 2120 2122 2124 2126 2128 2130 2132 2134 2136 2138
06: 07: 100 04: 04: 07: 09: 11: 04: 12:	330 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	555 (120)	0152 1065 0536 1023 0672 0095 0800 1115 0888 1226 0000 1276 0888	0762 0063 0472 0476 0627 0748 0912 0611 0469 0677 0476		J N R R J N J R J	PRE D0001 D0002 D0003	24 60 69 65 20 60 69 94 65 00 69	EXITX ROOO2 PRE EOUIV BLANK 88THX OPTIM 0800 0888	SUBR9 D0004 D0008 SB10B SUB11 D0001 INDEX D0008 SUB11	EXITX	STORE EXIT ALPHARETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MDF OPERATION IF BLANK D AND MOF. STOP MACHINE BLANK D. BUT NOT MDF. FIND VALUE OF D TAGS AND EXIT FOR SUBROUTINE 11 DRUM ADDRESS. INDEX IF TAGGED ADDEND AND EXIT FOR USE IN SUBR 18 NEW SYMBOL. FIND EOUIVALENT	2114 2116 2118 2120 2122 2124 2126 2128 2130 2132 2134 2136 2138 2140
065 076 100 044 044 077 095 111 044 122 047 12	330 6 6 5 5 6 6 5 5 5 6 6 7 7 6 6 6 7 7 4 6 6 7 7 8 6	200 100 100 100 100 100 100 100 100 100	0152 1065 0536 1023 0672 0095 0800 1115 0888 1226 0000 1276 0888 0778 0808	0762 0063 0472 0476 0627 0748 0912 0611 0469 0677 0476 0611		J N R R J N J R J	PRE D0001 D0002 D0003 D0004	24 60 69 65 20 60 69 94 65 00 69	EXITX ROOO2 PRE EOUIV BLANK 88THX OPTIM 0800 0888	SUBR9 D0004 D0008 SB10B SUB11 D0001 INDEX D0008 SUB11 D0009	EXITX	STORE EXIT ALPHABETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MDF OPERATION IF BLANK D AND MDF. STOP MACHINE BLANK D. BUT NOT MDF. FIND VALUE OF D TAGS AND EXIT FOR SUBROUTINE 11 DRUM ADDRESS. INDEX IF TAGGED ADDEND AND EXIT FOR USE IN SUBR 18 NEW SYMBOL. FIND EOUIVALENT TAGS AND EXIT FOR USE IN SUBR 11	2114 2116 2118 2120 2122 2124 2126 2128 2130 2132 2134 2136 2138 2140 2142 2144 2146 2148
06:07(100) 04(0) 04(0) 04(0) 07(0) 111 04(12) 04(12) 04(12) 04(12) 07(0) 07(0)	330 6 6 5 5 6 6 7 7 6 6 6 7 7 4 6 6 7 7 8 6 7 7 8 6 7 7 8 6 7 7 8 6 7 7 8 6 7 7 8 6 7 7 8 6 7 7 8 6 7 7 8 7 8	20 20 20 20 20 20 20 20 20 20 20 20 20 2	0152 1065 0536 1023 0672 0095 0800 1115 0888 1226 0000 1276 0888 0778 0808 1086	0762 0063 0472 0476 0627 0748 0912 0611 0469 0677 0476 0611 0477 0441		J N R R J N J R J R	PRE D0001 D0002 D0003 D0004	24 60 69 65 20 60 69 94 65 00 69 00 69 00 69	EXITX ROOO2 PRE EOUIV BLANK 88THX OPTIM 0800 0888	SUBR9 D0004 D0008 SB10B SUB11 D0001 INDEX D0008 SUB11 D0009 SUB13	EXITX	STORE EXIT ALPHARETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MDF OPERATION IF BLANK D AND MDF. STOP MACHINE BLANK D. BUT NOT MDF. FIND VALUE OF D TAGS AND EXIT FOR SUBROUTINE 11 DRUM ADDRESS. INDEX IF TAGGED ADDEND AND EXIT FOR USE IN SUBR 18 NEW SYMBOL. FIND EOUIVALENT TAGS AND EXIT FOR USE IN SUBR 11 800X AODRESS. FIND DYNAMIC LEVEL TAGS AND EXIT FOR USE IN SUBR 11	2114 2116 2118 2120 2122 2124 2126 2128 2130 2132 2134 2136 2138 2140 2142 2144 2146 2148 2150
065 076 106 044 077 095 111 044 122 047 127 077 078	330 6 6 552 6 6 6 552 6 6 6 6 6 6 6 6 6 6 6	20 120 120 120 120 120 120 120 120 120 1	0152 1065 0536 1023 0672 0095 0800 1115 0888 1226 0000 1276 0888 0778 0808 1086 0294	0762 0063 0472 0476 0627 0748 0912 0611 0469 0677 0476 0611 0477 0441		J N R R J N J R J S J	PRE D0001 D0002 D0003 D0004	24 60 69 65 20 60 69 94 65 00 69 00 69 00 69	EXITX ROOO2 PRE EOUIV BLANK 88THX OPTIM OBOO O888 OOOO	SUBR9 D0004 D0008 SB10B SUB11 D0001 INDEX D0008 SUB11 D0009 SUB13 SUB17	EXITX	STORE EXIT ALPHABETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MDF OPERATION IF BLANK D AND MDF. STOP MACHINE BLANK D. BUT NOT MDF. FIND VALUE OF D TAGS AND EXIT FOR SUBROUTINE 11 DRUM ADDRESS. INDEX IF TAGGED ADDEND AND EXIT FOR USE IN SUBR 18 NEW SYMBOL. FIND EOUIVALENT TAGS AND EXIT FOR USE IN SUBR 11 800X ADDRESS. FIND DYNAMIC LEVEL TAGS AND EXIT FOR USE IN SUBR 11 PERHAPS MODIFY DYNAMIC LEVEL	2114 2116 2118 2120 2122 2124 2126 2128 2130 2132 2134 2136 2138 2140 2142 2144 2146 2148 2150 2152
065077 100 044 044 077 097 111 04 122 047 107 077 108 04	390 6 6 5 2 6 6 7 7 0 6 6 7 7 1 6 9 6 7 7 1 6 9 6 7 7 8 0 6 7 8 0 6	20 120 120 120 120 120 120 120 120 120 1	0152 1065 0536 1023 0672 0095 00800 1115 0888 1226 0000 1276 0888 0778 0808 1086 0294 0928 0000 0184	0762 0063 0472 0476 0627 0748 0912 0611 0469 0677 0476 0611 0477 0441 0782 0586 1049		J N R R J N J R J S J	PRE D0001 D0002 D0003 D0004 D0005	24 60 69 65 20 60 69 94 65 00 65 00 65 00 65 69 15 69 00	EXITX ROOO2 PRE EOUIV BLANK 88THX OPTIM OBOO O888 OOOO	SUBR9 D0004 D0008 SB10B SUB11 D0001 INDEX D0008 SUB11 D0009 SUB13 SUB17 B	EXITX	STORE EXIT ALPHABETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MDF OPERATION IF BLANK D. AND MDF. STOP MACHINE BLANK D. BUT NOT MDF. FIND VALUE OF D TAGS AND EXIT FOR SUBROUTINE 11 DRUM ADDRESS. INDEX IF TAGGED ADDEND AND EXIT FOR USE IN SUBR 18 NEW SYMBOL. FIND EOUIVALENT TAGS AND EXIT FOR USE IN SUBR 11 800X ADDRESS. FIND DYNAMIC LEVEL TAGS AND EXIT FOR USE IN SUBR 11 PERHAPS MODIFY DYNAMIC LEVEL 1	2114 2116 2118 2120 2122 2124 2126 2128 2130 2132 2134 2136 2138 2140 2142 2144 2146 2148 2150
06-077 10-0 04-0 04-07-0 09-111 04-122 04-1 122 04-1 07-07-18 09-07-112-1 12-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	390 6 6 5 2 6 6 7 7 0 6 7 7 1 6 9 7 7 7 1 6 9 7 7 7 7 8 0 9 7 7 7 8 0 9 7 7 7 8 0 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	555 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0152 0536 1023 0672 0095 0800 1115 0888 1226 0000 1276 0888 0778 0808 0294 0928 00000 0184 1243	0762 0063 0472 0476 0627 0748 0912 0611 0469 0677 0476 0411 0477 0441 1049 0677	1023	J N R R J N J R J R J R R	PRE D0001 D0002 D0003 D0004 D0005	24 60 69 65 20 60 69 94 65 00 69 00 65 69 00 65 69 00 69 00 65 69 00 60 00 69 00 60 00 69 00 60 00 60	EXITX ROOO2 PRE EOUIV BLANK 88THX OPTIM 0800 0888 0000	SUBR9 D0004 D0008 SB10B SUB11 D0001 INDEX D0008 SUB11 D0009 SUB13 SUB17 B INDEX	EXITX BLANK	STORE EXIT ALPHARETICAL D INTO UPPER ANALYZE D-ADDRESS BRING EOUIVALENT. MULTIBRANCH STORE EOUIV OF BLANK FOR REFERENCE N.G. OUIT AND OMIT PUNCHING BLANK D. IS IT MOF OPERATION IF BLANK D AND MOF. STOP MACHINE BLANK D. BUT NOT MOF. FIND VALUE OF D TAGS AND EXIT FOR SUBROUTINE 11 DRUM ADDRESS. INDEX IF TAGGED ADDEND AND EXIT FOR USE IN SUBR 18 NEW SYMBOL. FIND EOUIVALENT TAGS AND EXIT FOR USE IN SUBR 11 800X ADDRESS. FIND DYNAMIC LEVEL TAGS AND EXIT FOR USE IN SUBR 11 PERHAPS MODIFY DYNAMIC LEVEL TAGS AND EXIT FOR USE IN SUBR 11 PERHAPS MODIFY DYNAMIC LEVEL CORE ADDRESS. INDEX IF TAGGED AODEND AND EXIT FOR SUBROUTINE 18 STORE THE CORE ADDRESS FOR PUNCHING	2114 2116 2118 2120 2122 2124 2126 2128 2130 2132 2134 2136 2138 2140 2142 2144 2146 2148 2150 2152

1049 69 0095 0948 0948 91 0177 0335		СВ	69 OPTIM 91 EXITX	SB10C		SEVERAL CASES. WHAT KIND OF OP O, BRANCH. I, ARITHMETIC.	2166 2168
0477 69 1065 0661		N 00009	69 PRE	SUBR7		STORE EQUIVALENT OF NEW SYMBOL	2170
0478 00 0000 0470		R D0010	00 0000	00002		SYMB TABLE FULL OR ORUM PACKEO. OUIT	2172
			SI.	IBROUTINE 21	1 PRO	ESS I FORWARO	2174
			HEO	broot the 2.		255 I FORMANO	2176
0018 24 0177 0680 0680 60 0153 0962 0962 69 1215 0063	0177	N SUB21	24 EXITX 60 R0003 69	SUBR9	EXITX	STORE EXIT ALPHABETIC I TO UPPER ANALYZE I-AOORESS	2178 2180 2182
1215 65 0536 0575		J	65 EQUIV	10004		BRING EQUIVALENT. MULTIBRANCH	2184
0572 20 1023 0577	1023	N 10001	20 BLANK	10006	BLANK	STORE EQUIVALENT OF BLANK FOR REFERENC	2186
0573 60 0722 0627		R 10002	60 89THX	SB10B		N.G. OUIT AND OMIT PUNCHING	2188
0574 60 0152 1012		R 10003	60 R0002			BLANK I. IS D ALSO BLANK	2190
1012 44 1265 0616 0616 69 1669 1274 1274 90 0978 0573			44 DNB 69 ORUMT 90	10002		O, O IS NOT BLANK. BLANK O ANO I. CHECK DRUM TAG I. DRUM IS FULL	2192 2194 2196
0978 65 1023 0579			65 BLANK	10008		MAKE BLANK I EQUAL TO BLANK O	2198
1265 65 0768 0611		N DNB	65	SUB11		USUAL CASE, I BLANK AND NOT O.	2200
0768 00 0889 0572		J	00 0889	10001		TAGS AND EXIT FOR SUBROUTINE 11	2202
0575 69 1028 0677		N 10004	69	INOEX		ORUM AOORESS. INOEX IF TAGGEO	2204
1028 00 0001 0577		J	00 0001	10006		ACCENDS AND EXIT FOR USE IN SUBR 18.	2206
0576 65 0979 0611		R 10005	65	SUB11		NEW SYMBOL. FIND BEST VALUE.	2208
0979 00 0889 0580		J	00 0889	10009		TAGS AND EXIT FOR SUBR 11.	2210
0577 20 0185 0177	0185	R 10006	20 P0009	EXITX	P0009	800X AODRESS. STORE AND EXIT	2212
0578 69 1331 0677		R 10007	69	INOEX		CORE ADORESS. INDEX IF TAGGED	2214
1331 00 0001 1236 1236 20 0185 0938 0938 69 1293 0441	0185	J	00 0001 20 P0009 69	SUB13	P0009	AOOENO AND EXIT FOR SUBROUTINE 18. STORE CORE AOORESS FOR PUNCHING FINO OYNAMIC LEVEL	2216 2218 2220
1293 00 0809 0998 0998 20 0292 0177	0292	J	00 0809 20 ORCEO	EXITX	ORCEO	TAGS AND EXIT FOR SUBROUTINE 13 STORE OYNAMIC LEVEL FOR REFERENCE	2222 2224
0579 20 0185 0177	0185	R 10008	20 P0009	EXITX	P0009	OTHER ADDRESS. STORE AND EXIT.	2226
0580 20 0185 0988 0988 69 0177 0661	0185	N 10009	20 P0009 69 EXITX	SUBR7	P0009	STORE EQUIVALENT OF NEW SYMBOL STORE SYMBOL AND ITS EQUIVALENT	2228 2230
0581 00 0000 0573	-1	R 10010	00 0000	10002		SYMBOL TABLE FULL. OMIT PUNCHING ADOR	2232
			SU	BROUTINE 22	2. SAVE	ORCEO ON FIRST BACKWARD CARO	2234
0201 69 1050 1062		N SUB22	69 1050			FIRST_CARD TAG	2236
1062 90 8002 1067 1067 69 0292 0645			90 8002 69 ORCEO			O+ WE ARE NOT ON FIRST BACKWARD CARO STORE ORCEO FOR USE WHEN WE START FORW	2238 2240
0645 24 0486 8002	0486		24 SAVOR	8002	SAVOR	STORE ORCEG FOR USE WHEN WE START FORW	2242
			RC HED	OUTINE FOR 1	TYPE 2	TARO, NAMELY RELOCATABLE SUBROUTINE	2244 2246
0002 69 1112 0039	-1	R 0002	69	SUB14		OP. C.I., TAGS. OPTIM, ALOPT	2248
1112 65 0157 1212 1212 10 0151 1262		J	65 R0007			NUMERICAL L	2250
1262 69 1315 1024			10 R0001 69	SUBR 8		ALPHABETIC L PROCESS L	2252 2254
1315 44 1321 1324 1324 20 0182 1286		J	44 NGL 20 P0006	PROD	P0006	O, RELOCATEO L IS EXCESSIVE STORE L FOR PUNCHING	2256 2258
1321 10 0186 1343 1343 21 0186 1286	0186	N NGL	10 P0010 21 P0010	PROO	P0010	FIX C.I. SO THAT L WILL NOT PUNCH) FIX C.I. SO THAT L WILL NOT PUNCH)	2260 2262
1286 65 0158 0614 0614 10 0152 1312 1312 69 0666 1024		C PROD	65 R0008 10 R0002	SUBR8	. 0010	NUMERICAL D ALPHARETIC, O PROCESS D	2264 2266 2268
0666 44 1326 1078		J	44 NGD	3230		D. RELOCATED D IS EXCESSIVE	2270
							22.0

1078 69 0982 0677			69		INDEX		INDEX D	2272
0982 00 0000 1336 1336 20 0184 1238	ر 0184	'	00 20	0000 P0008	PRD I	P0008	ADDEND AND EXIT FOR INDEXING STORE D FOR PUNCHING	2274 2276
1326 30 0001 1083 1083 10 0186 0494 0494 21 0186 1238 1238 65 0159 0664 0664 10 0153 0714 0714 69 1117 1024	0186	NGD PRQI	21 65	0001 P0010 P0010 R0009 R0003	PRD I	P0010	FIX C.I. SD THAT D WILL NOT PUNCH) FIX C.I. SD THAT D WILL NOT PUNCH) FIX C.I. SD THAT D WILL NOT PUNCH) NUMERICAL I ALPHABETIC I PROCESS I	2278 2280 2282 2284 2286 2288
1117 44 1228 1278 1278 69 1032 0677	J		44 69	NGI	INDEX		D.RELDCATED I IS EXCESSIVE INDEX I	2290 2292
1032 00 0001 1288 1288 20 0185 1338	° J 0185		00	0001 P0009	ALL	P0009	ADDEND AND EXIT FOR INDEXING STORE I FOR PUNCHING	2294 2296
1228 30 0002 1239 1239 10 0186 0544 0544 21 0186 1338 1338 60 0003 0057	0186	NGI ALL	21	0002 P0010 P0010 READC	ALL SB10A	P0010	FIX C.I. SD THAT I WILL NOT PUNCH) FIX C.I. SD THAT I WILL NOT PUNCH) FIX C.I. SD THAT I WILL NOT PUNCH) PREPARE TO PUNCH AND READ NEXT CARD	2298 2300 2302 2304
				EQU •	SYN+ AND	RED RE	DUTINES	2306
			HED EDU		DPTIM		DDUBLE-PURPDSE TD CONSERVE DRUM SPACE	2308 2310
0054 60 0153 0764	R	0054	60	R0003	вотн		EDU ENTRY. ALPHABETIC I	2312
0025 60 0153 0764 0764 69 1217 0063	R C	0025 BDTH	60 69	R0003	BDTH SUBR9		SYN ENTRY. ALPHABETIC I ANALYZE I	2314 2316
1217 65 0536 0120	J		65	EDUIV	D0003		BRING EDUIVALENT. MULTIBRANCH.	2318
0118 65 1328 1233	R	D0001	65	83RD	ВР		INVALID ADDRESS	2320
0119 65 1328 1233	R	D0002	65	83RD	ВР		BLANK I. CARD IS UNUSABLE	2322
0120 20 0095 1098	00 95 N	D0003	20	E	x	Ε	DRUM. PUT I-EDUIVALENT INTO E	2324
0121 65 1328 1233	R	D0004	65	83RD	вР		NEW SYMBDL I. CARD IS UNUSABLE	2326
0122 20 0095 1098	0095 R	D0005	20	E	x	E	800X ADDRESS	2328
0123 20 0095 1098	0095 R	D0006	20	E	x	Ε	CDRE ADDRESS	2330
0124 20 0095 1098 1098 60 0152 0914 0914 69 1267 0063		Q0007 X	20 60 69	E R0002	X SUBR9	Ē	OTHER ADDRESS ALPHARETIC D ANALYZE D	2332 2334 2336
1267 65 0095 0127	J		65	E	D0010		BRING VALUE OF I INTO LOWER	2338
0125 65 1328 1233	R	Q0008	65	83R0	ВР		N G D. CARD IS UNUSABLE	2340
0126 65 1328 1233	R	D0009	65	83RD	ВР		BLANK D. CARD IS UNUSABLE	2342
0127 20 0536 1289	0536 N	D0010	20	EQUIV	SD	EDUIV	DLO SYMBDL. STDRE I AS NEW EDUIV	2344
0128 20 0536 1289	0536 R	D0011	20	EDUIV	SD	EDUIV	NEW SYMBOL. STORE I AS ITS EDUIVALENT	2346
0129 20 0536 1289	0536 R	D0012	20	EQUIV	SD	EDUIV	BOOX. STORE ITS EDUIVALENT.	2348
0130 20 0536 1289	0536 R	D0013	20	EQUIV	SD	EDUIV	CDRE. STDRE I AS ITS EDUIVALENT.	2350
0131 20 0536 1289 1289 69 0594 0661		D0014 SD	20 69	EQUIV	SD SUBR7	EDUIV	DTHER. STORE I AS THE EQUIVALENT. STORE SYMBOL AND EDUIVALENT IN TABLE	2352 2354
0594 60 0095 1099 1099 69 0001 1025	J		60 69	E SETCC	SUB2R		BRING SYMBOL-EQUIVALENT TO UPPER RESERVE AND PUNCH CARD	2356 2358
1233 10 0003 0709	N	BP	10	REAQC	SUB10		BY-PASS INVALID CARD	2360
0098 65 0159 0964 0964 16 0409 1064 1064 46 1317 0968 0968 15 0726 1082	R	0098	16 46	R0009 2000I D CDIFF	CD		RED ENTRY. NUMERICAL I CDRE DR DRUM D, DRUM. I, CDRE. AOD CDRE RELDCATION AMOUNT	2362 2364 2366 2368
1317 15 1019 1082 1082 15 0409 0124		D CD	15	DDIFF	CD D0007		ADD DRUM RELOCATION AMDUNT RESTORE THE 2000 AND JUMP BACK	2370 2372
1328 00 8000 0000		83RD	00	8000	0000		The second state of the second	2374
				RBD	RQUTINE			2376
			HED					2378
0094 60 0158 1114	R	0094	60	R0008			BEGINNING OF REGIDN TO BE RESERVED	2380

1114 69 10	018 1025				69	SUB2R		RESERVE FIRST CELL IN BANO	2382
1018 60 01 1214 45 10			J		60 R0003 45	OUT		IS THE I-AOORESS BLANK O. NOT BLANK. I. IT IS BLANK.	2384 2386
1068 60 00 1264 10 00 0730 21 00 1314 11 00 0716 61 80 0780 46 10	320 0730 158 1314 159 0716 003 0780	0158			60 R0008 10 50IXX 21 R0008 11 R0009 61 8003 46 OUT	0094	R0008	BRING FIRST AOORESS AGAIN AOVANCE IT STORE AOVANCEO O AOORESS SUBTRACT ENO OF AREA TO BE RESERVEO CHANGE ITS SIGN O, WE HAVE FINISHEO	2388 2390 2392 2394 2396 2398
1329 70 03 1102 65 03 0766 16 03 1339 45 06 0694 60 80	160 0766 930 1339 644 0694		N OUT		70 R0001 65 R0010 16 94I 45 ALL 60 8001	SUB10		WHEN OONE; READ NEXT CARD IS THIS ANOTHER RBD CARD; IS THIS ANOTHER RBD CARD; I, IT IS ANOTHER RBD CARD PUNCH A CARO, AND REPEAT RBD	2400 2402 2404 2406 2408
1034 16 00 0744 11 80 0452 10 09 0980 46 12 0634 11 80	001 0452 916 0980 283 0634		A		16 16THX 11 8001 10 Q 46 00NE 11 8001	8002		OUPLICATE INTO AVAILABILITY TABLE)	2410 2412 2414 2416 2418
0644 61 12 0966 16 12			N ALL		61 SENO 16	8002		OUPLICATE INTO AVAILABILITY TABLE) OUPLICATE INTO AVAILABILITY TABLE)	2420 2422
1230 69 13	355 8003		J		69 A0001	8003		OUPLICATE INTO AVAILABILITY TABLE)	2424
1248 26 13	359 1034	1359	J SENO		24 A0005	A	A0005	OUPLICATE INTO AVAILABILITY TABLE)	2426
1283 65 16 0690 69 07			N OONE		65 ZEROX 69	SUB2R		CLEAR ACCUMULATOR RESERVE 0000	2428 2430
0794 60 01	160 0709				60 R0010	SUB10		PUNCH CARO AND PROCEED	2432
0916 24 19	555 0000	15 5 5	0 0		24 A0201	0000	A0201		2434
0930 00 00	000 0094		K 94I		00 0000	0094			2436
					E0	R, BLA, AND	RBR R		2438 2440
0029 69 12					69 ZQ	SUB		BLR ENTRY. TO SUBROUTINE	2442
0021 69 10 1298 24 16 1280 69 13	044 1298 669 1280	1669	J ZQ R OC	21	69 SETCC 69 81STX 24 ORUMT 69	SUB2R SUB	ORUMT	TO RESERVING SUBROUTINE BLA ENTRY. CHANGE ORUM TAG CHANGE ORUM TAG. ORUM CANNOT BE FULL. TO SUBROUTINE	2444 2446 2448 2450
1333 69 00			J		69 SETCC	SUB2U		TO UNRESERVING SUBROUTINE	2452
0099 69 05			R 00		69	SUB		RBR ENTRY. TO SUBROUTINE	2454
0502 10 10			J		10 00IFF	zo		A00 RELOCATION AMOUNT	2456
0740 24 01 1282 65 01 1016 45 13	179 1282 153 1016	0179	N SUB		24 EXITZ 65 R0003 45	BL	EXITZ	STORE EXIT ALPHARETICAL I I, I IS UNPUNCHEO	2458 2460 2462
1330 65 01 1066 16 01 1332 10 01	158 1332		C BL		65 R0009 16 R0008 10 R0008	BL EXITZ		NUMERICAL I INTO LOWER SUBTRACT NUMERICAL O FROM LOWER NUMERICAL O INTO UPPER	2464 2466 2468
				н	REI	G ROUTINE			2470 2472
0097 65 01 1116 30 00 0790 16 13 1216 46 08	008 0790 308 1216		R 00	97		G ROUTINE		REGION OESIGNATOR TO RIGHT ENO) REGION OESIGNATOR TO RIGHT ENO) SUBTRACT 90 IF A QIGIT. TO BLR WITHOUT DESIGNATING	
1116 30 00 0790 16 13 1216 46 06 0684 15 11 0734 46 00 0940 35 00 0552 15 12	008 0790 308 1216 684 0029 119 0734 029 0940 004 0552 266 0784		R OC	97	E0 65 R0002 30 Q008 16 99 THX 46 15 29 I X X 46 Q004 15 ST	0029		REGION OESIGNATOR TO RIGHT END) SUBTRACT 90 IF A QIGIT, TO BLR WITHOUT DESIGNATING AGO 29 IF SPEC CHAR, TO BLR DIRECTLY SHIFT TO Q POSITION MAKE STORING ORDER	2472 2474 2476 2478 2480 2482 2484 2486 2488
1116 30 00 0790 16 13 1216 46 06 0684 15 11 0734 46 00 0940 35 00	008 0790 308 1216 684 0029 119 0734 029 0940 004 0552 266 0784 158 8002	1660	R 00)97	E0 65 R0002 30 0008 16 99THX 46 15 29IXX 46 0029 35 0004		G0001	REGION DESIGNATOR TO RIGHT END 1 SUBTRACT 90 IF A QIGIT, TO BLR WITHOUT DESIGNATING AGO 29 IF SPEC CHAR, TO BLR DIRECTLY SHIFT TO 0 POSITION	2472 2474 2476 2478 2480 2482 2484 2486

HEO RQUTINE 2494

		HE0			2496
0084 65 0990 8002	R 0084		8002	A001NG OROER TO LOWER	2498
0990 10 1898 0608 0608 44 1316 0001	J R U0001	10 ZMAXM 44	U0001 SETCC	AOO A SYMBOL TO UPPER I, IT IS ZERO ANO WE HAVE FINISHEO	2500 2502
1316 35 0008 1040 1040 30 0008 1118 1118 44 0001 0934 0934 15 1090 8002		35 0008 30 0008 44 SETCC 15 K	8002	CLEAR ALL EXCEPT LAST CHARACTER) CLEAR ALL EXCEPT LAST CHARACTER) O+ OUIT BECAUSE WE HAVE FOUND LONG SYM MAKE STORING OROER, AND STORE ZERO	2504 2506 2508 2510
0609 16 1218 8002	R U0002	16 KA	8002	RESTORE LOWER, AND ADD NEXT SYMBOL	2512
1090 11 0000 0001	PK	11 0000	0001	TO CHANGE ADDING ORDER TO STORING ONE	2514
1218 11 0001 0001	P KA	11 0001	0001	TO CHANGE STORING OROER TO AOOING ONE	2516
		ALF	ROUTINE		2518 2520
0016 65 0114 0984 0984 24 1030 1084 103 1084 24 0197 1350 019 1350 69 0154 1268 1268 24 0186 1240 018 1240 69 0944 0042	7	65 91STX 24 1030 24 ALOPT 69 R0004 24 P0010	SUB19	TAG IN CASE L IS UNDEFINED SYMBOL) 1030 TAG IN CASE L IS UNDEFINED SYMBOL) ALOPT TAG IN CASE L IS UNDEFINED SYMBOL) CONTROL INFORMATION) POO10 CONTROL INFORMATION) PROCESS L. IF REGIONAL OR SYMBOLIC	2522 2524 2526 2528 2530 2532
0944 65 0152 1318 1318 24 0185 1290 018	J 5	65 R0002 24 P0009		ALPHABETIC SYMBOL POOO9 STORE LAST 4 OIGITS OF CONSTANT IN I	2534 2536
1290 30 0004 0602 0602 20 0184 1340 018 1340 24 0183 0994 018 0994 60 0003 0057		30 0004 20 P0008 24 P0007 60 REAOC	SB10A	POOO8 STORE NEXT 4 OIGITS IN O POSITION POOO7 STORE FIRST 2 OIGITS IN OP POSITION PUNCH	2538 2540 2542 2544
		PA1 HEO	ROUTINE		2546 2548
0073 60 0010 0709	R 0073	60 0010	SUB10	PUNCH USUAL OUMMY OUTPUT CARO	2550
0010 69 1234 1244 1244 24 0186 1294 018 1294 60 1348 1284 1284 15 1344 1249 1249 20 0177 1334 017 1334 15 0695 1299 1299 20 0179 0745 017 0745 15 0695 1349 1349 20 0185 0795 018 0795 15 0695 0652 0652 20 0183 8003 018	5 7 C LOOP 9	69 85TH 24 P0010 60 A1 15 RS1 20 P0001 15 C3 20 P0003 15 C3 20 P0009 15 C3 20 P0007	LOOP 8003	C.1. FOR AVAILABILITY TABLE) POO10 C.1. FOR AVAILABILITY TABLE) VARIABLE BRINGING ORDER INTO UPPER INITIAL WORD SHOWING LOCATION OF TABLE POO11 STORE LOCATION OF AVAILABILITY WORD MODIFY IDENTIFICATION OF WORD POO03 STORE LOCATION OF AVAILABILITY WORD MODIFY IDENTIFICATION OF WORD POO07 STORE LOCATION OF AVAILABILITY WORD MODIFY IDENTIFICATION OF WORD POO07 STORE LOCATION OF AVAILABILITY WORD POO07 STORE LOCATION OF AVAILABILITY WORD	2552 2554 2556 2558 2560 2562 2564 2566 2568 2570
0168 2# 0178 0945 0178 0945 10 0702 8003		24 P0002 10 C6	8003	POOO2 STORE AVAILABILITY WORD MOOIFY BRINGING ORDER, AND BRING	2574 2576
0169 2 4 0180 0995 018- 0995 10 0702 8003	R T0002	24 P0004 10 C6	8003	POOO4 STORE AVAILABILITY WORD MOOIFY BRINGING ORDER, AND BRING	2578 2580
0170 24 0182 1045 018 1045 10 0702 8003	2 R T0003	24 P0006 10 C6	8003	POOO6 STORE AVAILABILITY WORD MOOIFY BRINGING ORDER: AND BRING	2582 2584
0171 24 0184 1095 018 1095 10 0702 8003	4 R T0004	24 P0008 10 C6	8003	POODS STORE AVAILABILITY WORD MODIFY BRINGING ORDER, AND BRING	2586 2588
0172 71 0177 1096 1096 11 1352 1046 1046 44 0752 0003	R T0005	71 P0001 11 0 44	REAOC	PUNCH A CARO OF THE TABLE ARE WE OONE O. WE ARE NOT OONE.	2590 2592 2594
0752 10 1245 0952 0952 16 1295 1249		10 OS 16 C7	LOOP	RESTORE VARIABLE BRINGING OROER MOOIFY IOENTIFICATION FOR NEXT CARO	2596 2598
1348 69 1355 0168	P A1	69 A0001	T0001	INITIAL VARIABLE BRINGING OROER	2600
0702 00 0001 0001	P C6	00 0001	0001	TO MODIFY VARIABLE BRINGING OROER	2602
1352 69 1555 0172	0 0	69 A0201	T0005	COMPARISON CONSTANT FOR ENO OF JOB	2604
1245 69 1555 0168	o os	69 A0201	T0001	TO RESTORE BEFORE ENO OF JOB	2606
1344 00 0000 0450 0695 00 0500 0500 1295 00 1499 1499 1234 00 0080 0000	K RS1 K C3 K C7 K 85TH	00 0000 00 0500 00 1499 00 0080	0450 0500 1499 0000	INITIAL IOENTIFICATION OF WORD TO MODIFY IDENTIFICATION TO MODIFY INCENTIFICATION AT ENO OF LI	2608 2610 2612 2614

							HED		REL	ROUTINE			2616 2618
		0152 0596			R	009	3 65 45	R0002		s00		ALPHARETIC D IF 0 IS BLANK, WE SHOULD STORE ZERO	2620 2622
0646	20	0158 1019 0153	0696	1019	c	s00	20	R0008 001FF R0003		SDO	OOIFF	BRING NUMERICAL O STORE DRUM RELOCATION AMOUNT ALPHARETIC I	2624 2626 2628
0746	45	0796	0946				45			SC0		JUMP IF I IS BLANK	2630
		0159 0726	0946 0001	0726	c	sco		R0009 COIFF		SCO SETCC	COIFF	BRING NUMERICAL I STORE CORE RELOCATION AMOUNT	2632 2634
									вор	ROUTINE			2636
0027	69	0001	0006		R	002	7 69	SETCC		SUBR1		TO INITIALIZING SUBROUTINE	2638
									GEN	ERAL CONST	TANTS		2640
		0000				110TH	00			0001			2644
		0000				21 X X X 41 X X X	00			0002 0004			2646 2648
		0000				810TH	00			9000			2650
		0000				251XX	00			0025			2652
		0000				291XX	00			0029			2654
		0000				50IXX	_ 00			0050			2656
		0000				89THX	00			0080			2658
		0000				99THX 88THX	00			0090 0800			2660 2662
		0000				20001	00	000		2000			2664
		0000				87THX	00			8000			2666
		0001				16THX	00			0000			2668
0492	00	0002	0000		K	20XXX	00	000		0000			2670
		0000				12NOX	01	000		0000			2672
		0000				11STX	10			0000			2674
		0000				81STX	80			0000			2676
		0000				91STX ZTABL	90			0000		FRET OF CYMPOL TABLE	2678
0395	00	0210	0000			ZTABL	PAT		.0	0000		LENGTH OF SYMBOL TABLE	2680 2682

INSTRUCTIONS LISTED IN ORDER OF DATA ADDRESS

0520 00 0000 0329 0523 00 0000 0519 0524 00 0000 0329 0527 00 0000 0081 0264 45 0000 0001 0277 00 0000 0269 0624 00 0000 0376 0727 00 0000 0631 0927 00 0000 0373 0373 01 0000 0373 0378 60 0000 0605 0687 00 0000 0605 0687 00 0000 0756 0423 00 0000 0756 0423 00 0000 0756 0423 00 0000 0479 1226 00 0000 0479 0228 00 0000 0373 0478 00 0000 0470 0581 00 0000 0573 0982 00 0000 1336 1090 11 0000 1001	R X0003 R X0006 R X0007 R X0010 P C4 R M0010 J G C0010 R J0006 J F J L0006 R L0008 J R C0010 R L0008 J R C0010 R I0010	00 0000 00 0000 00 0000 00 0000 45 0000 00 0000 00 0000 00 0000 01 0000 06 0000 06 0000 06 0000 00 0000 00 0000 00 0000 00 0000 00 0000 00 0000 01 0000	X1 X0002 X1 F 0001 M0002 A C0002 J0006 SETCC L0002 00008 00002 10002	DRUM, OLD SYMB, REG. FIXED CORE. TREAT SAME AS BLANK OTHER ADDRESS. FIXED OLO SYMBOL, ORUM, REGION, FIXED OLFFERENCE OF BRINGING AND STORING ORD NEW SYMBOL, BUT SYMBOL TABLE FULL TAG-IDENTIFICATION, AND EXIT FOR 18 AODEND AND EXIT FOR SUBROUTINE 18 NEW SYMBOL, BUT TABLE FULL. N.G. 800X RANGE. ERROR. BRING APPROPRIATE TABULAR VALUE TO BUILD EXIT FROM SUBROUTINE 13 BRING ADDRESS. OUIT IMMEDIATELY MISCELLANEOUS ADDRESS. OUIT AND OMIT ADDEND AND EXIT FOR USE IN SUBR 18 AODEND AND EXIT FOR SUBROUTINE 13 SYMBOL TABLE FULL. ORUM PACKED. QUIT SYMBOL TABLE FULL. ORUM PACKED. QUIT SYMBOL TABLE FULL. ORUM PACKED. QUIT SYMBOL TABLE FULL. ORUM PACKED.	704 708 710 728 1130 1216 1246 1264 1284 1318 1568 1622 1842 2102 2110 2138 2154 2172 2232
1232 69 0001 1025 1333 69 0001 1075 1118 44 0001 0934 1218 11 0001 0001 0702 00 0001 0001 0027 69 0001 0375 1028 00 0001 0577 1331 00 0001 1236 1032 00 0001 1288 1099 69 0001 1025	J ZQ J P KA P C6 R 0027 J J J	69 SETCC 69 SETCC 44 SETCC 11 0001 00 0001 69 SETCC 00 0001 00 0001 00 0001 00 0001 69 SETCC	SUB2R SUB2U 0001 0001 SUBR1 J0008 I0006	TO RESERVING SUBROUTINE TO UNRESERVING SUBROUTINE O, QUIT BECAUSE WE HAVE FOUND LONG SYM TO CHANGE STORING ORDER TO ADDING ONE TO MODIFY VARIABLE BRINGING ORDER TO INITIALIZING SUBROUTINE ADDEND AND EXIT FOR SUBROUTINE 18 ADDENDS AND EXIT FOR USE IN SUBR 18. ADDEND AND EXIT FOR SUBROUTINE 18. ADDEND AND EXIT FOR USE IN SUBR 18. ADDEND AND EXIT FOR INBENUTINE 18. ADDEND AND EXIT FOR INDEXING RESERVE AND PUNCH CARO	2444 2452 2508 2516 2602 2638 1312 2206 2216 2294 2358
0994 60 0003 0057 0100 69 0003 0006 0015 60 0003 0057 0001 60 0003 0709 1338 60 0003 0057 1233 10 0003 0709	N 0100 J N SETCC C ALL N BP	60 READC 69 READC 60 READC 60 READC 10 READC	SB10A SUBR1 SB10A SUB10 SB10A SUB10	PUNCH INITIALIZE AT START OF ASSEMBLY PREPARE TO PUNCH CARO SEOUEL TO MANY PSEUDO-OPS. PREPARE TO PUNCH AND READ NEXT CARO BY-PASS INVALIO CARO	2544 362 392 1580 2304 2360
0051 69 0004 0107	N MOFLP	69 P	Α	STARTED SEARCH WITH MOF OPERATION	398
0256 69 0009 0039		69	SUB14	GET OP, C.I., TAGS, OPTIM, ALOPT.	660
0073 60 0010 0709	R 0073	60 0010	SUB10	PUNCH USUAL DUMMY DUTPUT CARD	2550
0007 44 0011 0012		44 MDFLI	ABCOE	IF SO, START FORWARD SEARCH	388
0283 96 0012 0138 0141 69 0012 0045	J	96 ABCOE 69 ABCOE	SUB20	IF WITH I+ PROCESS LIKE 08 PROCESS D+ AND TO 08 ROUTINE	538 542
0011 69 0014 0107	N MDFLI	69 I	A	STARTEO SEARACH WITH INDEXEO D	400
0012 69 0015 0018	C ABCDE	69	SUB21	PROCESS I	390
0321 10 0024 8003		10	8003	STORE PROCESSEO CARO)	878
0023 45 0026 0077 0071 44 0026 0076 0060 44 0026 0064 0150 94 0026 0055 0307 45 0026 0136 0173 44 0026 0078 0457 45 0026 0111	J	45 OUITT 44 QUITT 44 OUITT 94 OUITT 45 OUITT 44 QUITT 45 QUITT	В	O, IT IS NOT, AND WE OUIT IF SO, OUIT SEARCH IF N G, OUIT SEARCH IF SO, OUIT SEARCH IF SO, OUIT SEARCH IF IS N G, OUIT SEARCH IF I IS N G, OUIT SEARCH IF I SO, OUIT SEARCH	436 444 456 462 466 474 486
0734 46 0029 0940		46 0029		IF SPEC CHAR, TO BLR DIRECTLY	2484
0028 11 0031 0035	x	11 0		STORE SET OF DATA)	414
0078 45 0032 0019 0336 95 0032 0012		45 BCOEF 95 BCDEF	BACKW ABCDE	IF I IS FIXEO, START BACKWARO WITH I. EXIT ACCORDING TO WHY SEARCH	476 612
0081 91 0034 0436	C F	91 XX8		MULTIPLE BRANCH ACCORDING TO TAGS)	738
0033 69 0036 0039		69	SUB14	OP+ Cal++ OPTIM+ ALOPT+ ETC+	376
0585 69 0038 0741 0686 66 0038 0643 0462 16 0038 0793 0562 15 0038 0793 1034 16 0038 0744 0035 15 0038 0043 0161 15 0038 0143 0327 16 0038 0243 0265 16 0038 0293	N SHRT	69 16THX 66 16THX 16 16THX 15 16THX 16 16THX 15 16THX 15 16THX 16 16THX 16 16THX	ST ST	PRESET T AS POSITIVE 1) SHORT, PRESET T AS -1) COMPARISON CONSTANT FOR LAST PART COMPARISON CONSTANT FOR LAST PART DUPLICATE INTO AVAILABILITY TABLE) STORE SET OF DATA) BRING BACK A SET) BRING BACK A SET) BRING BACK A SET)	1502 1510 1642 1666 2410 416 560 642 652
0259 16 0038 0443 0547 15 0038 8002	C A	16 16THX 15 16THX	8002	STORE PROCESSED CARD) BRING BACK A SET OF RESULTS)	886 922
0087 24 0040 0193		24 SAVED	- 0002	SAVEO SAVE D FROM CARD THAT STARTED SRCH)	628

01	135 69	0040 0	343			69 SAVEO			8RING BACK L AND D)	678
00	041 10	0044 8	003		C LOOP	10	8003		STORE SET OF DATA)	408
01	147 10	0050 8	003			10 QS	8003		STORE SET OF DATA)	420
00	048 94	0051 0	053			94 MDFLP			D. YES	384
00	90 24 97 69	0052 0 0052 0 0052 0 0052 0	468 305	0052 0052	J LNM J LN	24 DONE 24 DONE 69 DONE 65 OONE	NO SU8R4 SU822	DONE OONE	PRESET EXIT FROM BACKWARDS ROUTINE) WITH L. ALTER EXIT) PROCESS L BACKWARDS SAVE ORCEO	632 684 762 786
02	257 69	0060 0	061			69	SU8R3		IF SO, IS IT FIXEO)	454
04 03 03 13	06 65 376 20 371 24 335 20 320 65	0062 0 0062 0 0062 0 0062 0 0062 0 0062 0	267 925 615 177 967	0062 0062 0062	J N A N J0004 N 5810C	65 OPREG 65 OPREG 20 OPREG 24 OPREG 20 OPREG 65 OPREG 15 OPREG	COOO8	OPREG	SAVE DYNAMIC LEVEL OF L FROM D) WHICH L IS LESS, MEASURED ON CIRCLE) STORE ADDRESS FOR OPTIMIZING NEXT ADDR ORUM OR ORUM EQUIVALENT FROM 4-5, 19-20. STORE DYNAMIC LEVEL WHICH ONE OO WE USE) AOD OLD OYNAMIC LEVEL	818 834 1278 1308 1602 1886 1902
01	163 69	0066 0	400		J	69	SU8R5		PROCESS BACKWAROS D ONCE MORE	852
01 02 02 02	165 16 218 60 219 65 221 65 223 65	0068 0 0068 0 0068 0 0068 0 0068 0 0068 0	323 177 177 177 177		R F0001 R F0002 R F0004 R F0006 R F0007	16 810TH 16 810TH 60 810TH 65 810TH 65 810TH 65 810TH 60 810TH	EXITX EXITX EXITX EXITX EXITX		IS CARO OF TYPE 08) IS IT TYPE 08) AOORESS IS N G BLANK ADDRESS SYMBOLIC ADDRESS, WITH UNDEFINED SYMB CORE ADDRESS OTHER ADDRESS. USUALLY PART OF CONST.	434 496 1154 1156 1160 1164 1166
		0069 0 0069 0		0069		22 OC 16 QC		oc	NOT 19T CARD. MAKE COMP. CONST.) IS THIS LAST SET	548 568
05	71 69	0074 0	377			69 8RNG			MAKE NEW BRINGING ORDER)	906
05	18 15	0075 0 0075 0 0075 0	329		R X0005 R X0001 R X0004	15 13RD 15 13RD 15 13RD	X1 X1 X1		800X • CALL IT UNFIXED ADDRESS N G • CALL UNFIXED NEW SYMBOL • UNFIXED	696 698 706
01	76 15	0079 0	233			15 710			IS TYPE 01	500
02	229 10	0082 8	002		C LOOP	10 SEND	8002		BRING BACK A SET)	552
00	83 65	0086 0	041			65 SEND	LOOP		STORE SET OF DATA)	406
00	76 45	0088 0	026			45 C	OUITT		IF SO, QUIT SEARCH)	446
00	36 69	0089 0	042		J	69	SU819		PROCESS L	378
00	88 69	0091 0	039		c c	69	SU814		GET OP, C.I., TAGS, OPTIM, ALOPT.	448
00	89 69	0092 0	045		J	69	SUB20		PROCESS 0	380
06 04 07 12 13 04 10 01 01 01	888 65 90 65 706 69 222 16 806 2 171 69 149 69 120 20 122 20 123 20 124 20 267 65	D095 0 0095 0 0095 0 0095 0 0095 0 0095 0 0095 0 0095 1 0095 1 0095 1 0095 1	699 749 548 785 648 748 948 098 098 098	0095 0095 0095 0095 0095	N FD N F18D R D0003 C 8 N Q0003 R Q0005 R Q0006 R Q0007 J	69 OPTIM 65 OPTIM 65 OPTIM 69 OPTIM 16 OPTIM 24 OPTIM 69 OPTIM 20 E 20 E 20 E 20 E 20 E 65 E	SEO X X X Q Q Q O O O O O O O O O O O O O	OPTIM E E E E	IS IT AN MOF OPERATION) FORWARD D. L-D ADDENDS. LEFT END LOWE FORWARD I OR BACKWARD D. GET ADDENDS OPTIMIZING TAGS REDUCE ADDENDS BY 1 FOR 80.82. OR 88 STORE OPTIMIZING AODENDS AND TAGS 8LANK D. IS IT MOF OPERATION SEVERAL CASES. WHAT KIND OF OP DRUM. PUT I-EQUIVALENT INTO E 800X ADDRESS CORE ADDRESS OTHER ADDRESS OTHER ADDRESS BRING YAUE OF I INTO LOWER 8RING SYMBOL-EQUIVALENT TO UPPER	382 1786 1798 1826 1848 1966 2128 2166 2324 2328 2330 2332 2332 2338 2356
01	193 69	0096 0	049			69 DN1			PRESET EXIT FROM BACKWARDS ROUTINE)	630
02	298 69	0101 0	018		J	69	SU821		PROCESS I FORWARDS	774
		0102 0 0102 0			J	69 LN 69 LN	SUB21 SUB20		PROCESS I FORWARDS PROCESS D FORWARDS	784 794
DD D2	32 65 27 65 258 65	0103 0 0103 D 0103 D 0103 D D103 0	4D7 041 557	D1D3	N OUT N BCDEF C LP N SKP	20 FINAL 65 FINAL 65 FINAL 65 FINAL	LOOP	FINAL	STORE VARIABLE ORDER IS STORAGE AREA FULL) ALL CASES, BACK TO START OF LOOP NOT 1ST CARD. MAKE COMP. CONST.) BRING BACK A SET)	422 478 512 544 634
03 03 03 10	331 21 312 60 362 6D 747 69	0108 0 0108 0 0108 D 0108 D 0108 8 D108 0 0108 D	361 513 563 DD2 763		C SU	60 SA 21 SA 6D SA 6D SA 69 HSYMB 11 HSYMB 21 HSYMB	8002	SA	ARE WE TO LAST LINE OF TABLE) STORE VARIABLE STORING ORDER MODIFY TO TAKE FIRST LINE, SAME COLUMN LAST LINE AND END OF WORD. MODIFY) STORE SYMBOL) SOME SYMBOL WAS FOUND. SUBTRACT OURS ADDRESS NOT BLANK. STORE SYMBOL	1018 1026 11D8 112D 1334 1422 1440

0416 60 0108 1013	N SYM	60 HSYMB		SYMBOLIC ADDRESS. BRING SYMBOL	1496
0356 65 0109 0113	J	65	SSB	BRING BACK BLANB AND ORCEB	816
0357 69 0110 0061		69	SUBR3	IS I A FIXED ADDRESS)	470
0791 01 0111 1219	J FULL	01 0111	NG	STOP IF SYMBOL TABLE IS FULL	1556
0309 46 0112 0213		46	OUT	CLEAR REGION AND SYMBOL TABLES)	958
0111 69 0114 0017 0188 69 0114 0067 1109 69 0114 0617 0016 65 0114 0984	N B R 0016	69 91STX 69 91STX 69 91STX 65 91STX		CHANGE FIRST-CARO INDICATOR TO 2ND) START ON L. FIRST-CARO TAG) CHANGE DRUM TAG TO 9) TAG IN CASE L IS UNOEFINED SYMBOL)	488 614 1700 2522
0263 11 0116 0671		11 796		ARE WE TO LAST LINE OF TABLE)	1020
0164 24 0117 0020 0117 0096 65 0117 0321 0398 20 0117 0570 0117 0137 65 0117 0571	J DN1 N OUT2 J ENOED	24 VAR2X 65 VAR2X 20 VAR2X 65 VAR2X		VAR2X PRESET TO STORE AFTER PROCESSING) ALL CASES. STORE PROCESSED CARD) VAR2X STORE PROCESSED CARD) MAKE NEW BRINGING ORDER)	620 876 892 904
0987 15 0132 1037 0529 15 0132 0187 0525 15 0132 0187 0528 15 0132 0187 0301 15 0132 0237 0351 16 0132 0287	R X0012 R X0008 R X0011	15 12NOX 15 12NOX 15 12NDX 15 12NOX 15 12NOX 16 12NDX	X2 X2 X2 XY	SHOULO WE INTERCHANGE ADDENDS) 800X AODRESS. UNFIXED 0 IS N G. CALL UNFIXED NEW SYMBOL. UNFIXED MOOIFY TO USE ROUTINE FOR UNFIXED D) MOOIFY ALOPT AGAIN)	1870 720 722 730 826 856
0231 61 0134 8003		61	8003	CLEAR REGION AND SYMBOL TABLES)	952
0133 96 0136 0088		96 B	c .	WITH I OR L. RESPECTIVELY	430
0288 69 0137 0090	N L	69 ENOED		WITH L. ALTER EXIT)	682
0286 69 0139 0018	J JUMP	69	SUB21	PROCESS I	586
0436 99 0140 0291		99	MISC	MULTIPLE BRANCH ACCORDING TO TAGS)	740
0138 69 0141 0042		69	SUB19	PROCESS L	540
0091 95 0144 0046 0064 45 0144 0019	J	95 K 45 K	BACKW	IS O ACTUALLY AN AOORESS IF FIXEO, START BACKWARD PROCESSING	450 458
0243 10 0146 8002	N LOOP	10	8002	BRING BACK A SET)	646
0043 44 0147 0148		44	OUT	STORE SET OF DATA)	418
0196 69 0149 0305	J	69	SUBR4	PROCESS L BACKWARDS	782
0037 24 0151 0104 0151		24 R0001		ROOO1 IF SO, PUT IN OUMMY MOVEABLE WORDS)	504
0250 24 0150 0408 0150	Q QS	24 R0000	x	RODOO RESTORE COMPARISON CONSTANT AND MODIFY	750
0044 69 0151 8002 0077 60 0151 0005 0253 70 0151 1007 0082 24 0151 0204 0151 0261 24 0151 0408 0151 0080 60 0151 0455 0480 60 0151 0712 1212 10 0151 1262 1329 70 0151 1102	J SENO Q Q N OUT	69 R0001 60 R0001 70 R0001 24 R0001 24 R0001 60 R0001 60 R0001 10 R0001 70 R0001	8002 X X	STORE SET OF OATA) ALPHARETIC L REAO ANOTHER CARO ROOOI BRING BACK A SET) ROOOI COMPAISON CONSTANT FOR ENO OF SET ALPHARETICAL L INTO UPPER ALPHABETICAL L TO UPPER ALPHABETIC L WHEN OONE, READ NEXT CARO	410 438 492 556 748 1174 2070 2252 2400
0046 60 0152 0257 0104 24 0152 0105 0152 0350 60 0152 1057 0230 60 0152 0958 0630 60 0152 0762 0574 60 0152 0102 0614 10 0152 1012 1098 60 0152 0914 0097 65 0152 1116 0944 65 0152 1318 0093 65 0152 1345	J	60 R0002 24 R0002 60 R0002 60 R0002 60 R0002 10 R0002 60 R0002 65 R0002 65 R0002 65 R0002		IF SO, IS IT FIXEO) ROOOZ IF SO, PUT IN DUMMY MOVEABLE WORDS) ALPHABETIC D. TO SEE WHETHER FIXED ALPHABETIC O INTO UPPER ALPHABETICAL O INTO UPPER BLANK I. IS O ALSO BLANK ALPHABETIC O ALPHABETIC O REGION OESIGNATOR TO RIGHT END) ALPHABETIC SYMBOL ALPHABETIC SO	452 506 714 1224 2118 2190 2266 2334 2474 2534
0136 60 0153 0357 0105 24 0153 0236 0153 0255 60 0153 0957 0330 60 0153 1108 0680 60 0153 0962 0664 10 0153 0764 0054 60 0153 0764 0025 60 0153 0764 1018 60 0153 1214 1282 65 0153 1016 0696 65 0153 0746		60 R0003 24 R0003 60 R0003 60 R0003 60 R0003 60 R0003 60 R0003 60 R0003 60 R0003 65 R0003 65 R0003	УҮҮ ВОТН ВОТН	IS I A FIXEO ADDRESS) RO003 IF SO, PUT IN OUMMY MOVEABLE WORDS) BRING ALPHABETIC I ALPHABETIC I TO UPPER ALPHABETIC I TO UPPER ALPHABETIC I TO UPPER ALPHABETIC I EOU ENTRY. ALPHABETIC I SYN ENTRY. ALPHABETIC I IS THF I-ADORESS BLANK ALPHABETICAL I ALPHABETIC I	468 508 690 1292 2180 2286 2312 2314 2384 2460 2628
0941 21 0154 0759 0154 0430 69 0154 1110 1350 69 0154 1268		21 R0004 69 R0004 69 R0004		ROOO4 TO SUPPRESS IN CASE WE SEARCH CONTROL INFORMATION FOR PUNCHING) CONTROL INFORMATION)	1998 1926 2528

0236 24 0155 0227 0031 69 0155 8002 0607 24 0155 0204 0146 24 0155 0408 0989 65 0155 1210	0155	0 0 0	24 R0005 69 R0005 24 R0005 24 R0005 65 R0005	LP 8002 X 1	R0005 R0005 R0005	EITHER CASE, SOMETHING INTO ROOO5 COMPARISON CONSTANT FOR STORING COMPARISON CONSTANT FOR BRINGING SET BRING BACK A SET) BRING TAGS ANO OPERATION	510 514 596 648 1930
0050 69 0156 8002 0200 24 0156 0204		0 0S 0 0S	69 R0006 24 R0006	8002 X	R0006	TO RESTORE COMPARISON CONST + AOVANCE TO RESTORE AND AOVANCE	516 598
1112 65 0157 1212		J	65 R0007			NUMERICAL L	2250
1286 65 0158 0614 0094 60 0158 1114 1068 60 0158 1264 0730 21 0158 1314 1066 16 0158 1332 1332 10 0158 0179 0784 69 0158 8002 0596 65 0158 0646	0158	C BL	65 R0008 60 R0008 60 R0008 21 R0008 16 R0008 10 R0008 69 R0008 65 R0008	BL EXITZ 8002 SDO	R0008	NUMERICAL O BEGINNING OF REGION TO BE RESERVEO BRING FIRST AODRESS AGAIN STORE AOVANCED O AOORESS SUBTRACT NUMERICAL O FROM LOWER NUMERICAL O INTO UPPER AOORESS OF 0001 OF REGION BRING NUMERICAL O	2466 2468 2490 2624
1238 65 0159 0664 0098 65 0159 0964 1314 11 0159 0716 1330 65 0159 1066 0796 65 0159 0946			65 R0009 65 R0009 11 R0009 65 R0009 65 R0009	sco		NUMERICAL I REO ENTRY. NUMERICAL I SUBTRACT ENO OF AREA TO BE RESERVEO NUMERICAL I INTO LOWER BRING NUMERICAL I	2284 2362 2394 2464 2632
0058 65 0160 0065 1007 65 0160 0165 1102 65 0160 0766 0794 60 0160 0709		N NO	65 R0010 65 R0010 65 R0010 60 R0010	SUB10		IS CARO OF TYPE 08) IS IT TYPE 08) IS THIS ANOTHER RBO CARO) PUNCH CARO ANO PROCEEO	432 494 2402 2432
0003 70 0161 1041		REAOC	70 R0011			REAO ONE CARO	364
0508 45 0162 0178			45	EXITY		O, WE HAVE NOT FINISHEO. I, WE HAVE.	1012
0560 65 0163 0113			65	SSB		BRING BACK BLANB AND ALOPT ONCE MORE	850
0313 46 0166 0178			46	EXITY		I. OVER 1999. WE RESERVE NOTHING	1046
0013 22 0167 0070 0377 22 0167 0620 0673 65 0167 0620 0648 20 0167 0620 0555 20 0167 0720 1273 65 0167 0720 1273 65 0167 0720 1273 65 0167 0741 1209 22 0167 0441 1209 22 0167 08001 0935 20 0167 1320 1014 65 0167 0771 0414 65 0167 0771 1281 20 0167 1071 1281 20 0167 1071 1281 20 0167 1271 0999 15 0167 0178 0621 16 0174 0379 072 65 0175 0429 0323 45 0176 0227 0661 24 0177 0030 0305 24 0177 0800 0400 24 0177 0330 0402 24 0177 0330 0142 24 0177 0330 0142 24 0177 0330 0142 24 0177 0330 0142 24 0177 0330 0142 24 0177 0330 0142 24 0177 0330 0142 24 0177 0330 0040 24 0177 0430 0049 71 0177 0480 0049 71 0177 0480 0045 24 0177 0480 0045 24 0177 0480 0045 24 0177 0680 0988 69 0177 0680 0988 69 0177 0680	0167 0167 0167 0167 0167 0167 0167 0167	C A	22 XXXX1 22 XXXX1 65 XXXX1 20 XXXX1 20 XXXX1 21 XXXX1 65 XXXX1 22 XXXX1 22 XXXX1 22 XXXX1 20 XXXX1 65 XXXX1 10 XXXX1 11 XXXX1 12 XXXX1 12 XXXX1 13 XXXX1 14 EXITX 24 EXITX 26 EXITX 27 EXITX 28 EXITX 29 EXITX 29 EXITX 20 EXITX 20 EXITX 21 EXITX 22 EXITX 24 EXITX 24 EXITX 25 EXITX 26 EXITX 27 EXITX 27 EXITX 28 EXITX 29 EXITX 20 EXITX 20 EXITX 20 EXITX 21 EXITX 22 EXITX 23 EXITX 24 EXITX 24 EXITX 25 EXITX 26 EXITX 27 EXITX 27 EXITX 28 EXITX 29 EXITX 20 EXITX 20 EXITX 20 EXITX 21 EXITX 22 EXITX 23 EXITX 24 EXITX 24 EXITX 25 EXITX 26 EXITX 27 EXITX 27 EXITX 28 EXITX 29 EXITX 20 EXI	LOOP LOOP EXITX SUB13 8001 BOTH EXITY LP 8003 SB10C SUBR7	XXXX1 XXXX1 XXXXX1 XXXXXX	BRING BACK A SET) MAKE NEW BRINGING OROER) BRING BACK A SET OF RESUTTS) STORE MODIFIED BRINGING OROER + REPEAT MAKE BRINGING OROER) STORE ADDRESS TEMPORARILY EOUTYALENT BACK TO LOWER AND EXIT PREPARE EXIT AND GO TO SUBROUTINE 13) NEW AVAILABILITY WORD INTO ORUM) ALL CASES. STORE ADDENDS OOO. SEPARATE LAST ADDEND STORE LAST A DIGITS OF OPTIM ADD IN TAGS FROM OPTIM STORE ADDRESS INTO UPPER ADD ADDRESS BEING INDEXED. BRING BACK A SET OF RESULTS) MAKE DRUM AVAILABLE) O, IT IS NOT. I, IT IS. STORE EXIT	1408 1620 1736 1884 1892 1898 1970
0172 71 0177 1096 0006 24 0178 0231 0415 46 0178 0569 1025 24 0178 0381 1075 24 0178 0491 0976 20 0178 0931 0693 69 0178 0981 1122 65 0178 1078 0586 24 0178 1281 0677 24 0178 1281 1121 65 0178 0783 0168 24 0178 0945 0661 24 0179 0432	0178 0178 0178 0178 0178	R TOOOS N SUBR1 N SUB2R N SUB2U C SSW N SUB17 N INOEX R TOOO1 N SUBR7	71 P0001 24 EXITY 46 EXITY 24 EXITY 24 EXITY 26 EXITY 69 EXITY 65 EXITY 24 EXITY	PAKT	EXITY EXITY EXITY EXITY EXITY EXITY POOO2	PUNCH A CARO OF THE TABLE STORE EXIT MAKE ORUM AVAILABLE) ENTRY TO RESERVE. STORE EXIT. ENTRY TO UNRESERVE. STORE EXIT. STORE EXIT OUT OF LOWER ALL CASES. GOING WHICH OIRECTION MODIFY EXIT) STORE EXIT INSTRUCTION STORE EXIT O-POSITION HOLOS O FOR 0, 1 FOR I) STORE AVAILABILITY WORO STORE EXIT	2590 950 976 1030 1034 1612 1630 1704 1992 2032 2036 2574

0063 24 0179 0482 1069 10 0179 8003 0441 24 0179 0532 0785 69 0179 0582 1325 69 0179 0632 0740 24 0179 1282 1299 20 0179 0745	0179 N SUBR9 C DON 0179 N SUB13 C SE0 0179 N SUB 0179	24 EXITZ 10 EXITZ 24 EXITZ 69 EXITZ 69 EXITZ 24 EXITZ 20 P0003	8003	EXITZ STORE EXIT FROM MANY PLACES. MULTIBRANCH EXITZ STORE EXIT ALL CASES. WHICH DIRECTION IF BACKWARD L, SUBTRACT TAG-COUNT) EXITZ STORE EXIT P0003 STORE LOCATION OF AVAILABILITY WORD	1434 1574 1778 1850 1906 2458 2564
0169 24 0180 0995	0180 R T0002	24 P0004		P0004 STORE AVAILABILITY WORD	2578
0057 15 0181 0635 1027 20 0181 0434 0650 69 0181 8002 0213 20 0181 0234	0 052	15 P0005 20 P0005 69 P0005 20 P0005	8002	ADVANCE CARO NUMBER 1 PO005 AOVANCE CARO NUMBER 1 RESTORE CONSTANT AND MODIFY PO005 CLEAR CARO NUMBER	904
0274 20 0182 0385 0421 20 0182 1285 0595 65 0182 1337 0424 20 0182 1335 1324 20 0182 1286 0170 24 0182 1045 0020 69 0182 0085 0241 24 0182 0135 0355 69 0182 8002 0242 24 0182 0285 0271 20 0182 0335	0182 N L0004 0182 R L0007 0182 0182 R T0003 0182 O 02 0182 J SEND	20 P0006 20 P0006 65 P0006 20 P0006 20 P0006 24 P0006 69 P0006 24 P0006 24 P0006 24 P0006 20 P0006	MW PROD 8002 X SB10C	P0006 CORE ADDRESS. STORE FOR PUNCHING P0006 ORUM. STORE ADDRESS FOR PUNCHING BRING BACK NUMERICAL ADDRESS P0006 CORE ADDRESS. STORE FOR PUNCHING P0006 STORE L FOR PUNCHING P0006 STORE AVAILABILITY WORD SAVE L FROM CARO THAT STARTEO SRCH) P0006 BRING BACK L AND D) COMPARISON CONSTANT FOR END OF SET P0006 BRING BACK A SET OF RESULTS) P0006 ORUM ADDRESS. STORE FOR PUNCHING	2104 2258 2582
0566 22 0183 0986 0598 60 0183 1237 1340 24 0183 0994 0652 20 0183 8003		22 P0007 60 P0007 24 P0007 20 P0007	8003	POOO7 STORE OPERATION FOR PUNCHING OPERATION IN 0 OF UPPER POOO7 STORE FIRST 2 DIGITS IN OP POSITION POOO7 STORE LOCATION OF AVAILABILITY WORD	
0631 20 0184 0487 0925 20 0184 0177 0402 60 0184 0789 0660 60 0184 0939 0992 24 0184 1287 0992 20 0184 0788 0476 20 0184 1049 1336 20 0184 1238 0602 20 0184 1340 0171 24 0184 1095 0191 69 0184 0087 0343 24 0184 0137	0184 R C0008 N SHOP N XAS 0184 0184 R D0008 0184 0184 R T0004	20 P0008 20 P0008 60 P0008 60 P0008 24 P0008 20 P0008 20 P0008 20 P0008 24 P0008 24 P0008 24 P0008	EXITX B PROI	PO008 STORE CORE ADDRESS FOR PUNCHING PO08 MISC ADDR. STORE FOR PUNCHING. EXIT SHIFT OPERATION. FORWARD 1. BACKW L. INDEXING OP, FORWARD 1. BACKWARD L. PO008 STORE THE ADDRESS FOR PUNCHING PO008 MISC ADDRESS, USUALLY A CONSTANT PO008 STORE OF PUNCHING PO008 STORE OF PUNCHING PO008 STORE AVAILABILITY WORD SAVE D FROM CARD THAT STARTED SRCH) PO008 BRING BACK L AND D)	2156 2164 2276 2540 2586
0375 20 0185 0177 0577 20 0185 0177 1236 20 0185 0938 0579 20 0185 0177 0580 20 0185 0177 0580 20 0185 0988 1288 20 0185 1338 1318 24 0185 1290 1349 20 0185 0795	0185 R 10006 0185 0185 R 10008	20 P0009 20 P0009 20 P0009 20 P0009 20 P0009 20 P0009 24 P0009	EXITX EXITX EXITX	PO009 OTHER ADDRESS, USUALLY A CONSTANT PO009 800X ADDRESS. STORE AND EXIT PO009 STORE CORE ADDRESS FOR PUNCHING PO009 OTHER ADDRESS. STORE AND EXIT. PO009 STORE EQUIVALENT OF NEW SYMBOL PO009 STORE I FOR PUNCHING PO009 STORE LAST 4 DIGITS OF CONSTANT IN I PO009 STORE LOCATION OF AVAILABILITY WORD	2228 2228 2296
0499 20 0186 0689 0627 10 0186 0941 0759 21 0186 0177 1110 24 0186 0989 1321 10 0186 1286 1083 10 0186 0494 0494 21 0186 1238 1239 10 0186 0544 0544 21 0186 1234 1268 24 0186 1240 1244 24 0186 1290 0024 69 0186 8002 0488 24 0186 0285	N S8108 0186 0186 0186 0186 0186 0186 0186	20 P0010 10 P0010 21 P0010 24 P0010 10 P0010 21 P0010 10 P0010 21 P0010 21 P0010 22 P0010 24 P0010 24 P0010 24 P0010 29 P0010 29 P0010 20 P0010 20 P0010	EXITX PROD PROI ALL 8002	POO1C C.1. TO PUNCH X-9) FROM 4-6.19-21. TO SUPPRESS) POO10 FROM 4-6.19-21. TO SUPPRESS) POO10 CONTROL INFORMATION FOR PUNCHING) FIX C.1. SO THAT L WILL NOT PUNCH) FIX C.1. SO THAT L WILL NOT PUNCH) FIX C.1. SO THAT D WILL NOT PUNCH) FIX C.1. SO THAT D WILL NOT PUNCH) FIX C.1. SO THAT D WILL NOT PUNCH) FIX C.1. SO THAT I WILL NOT PUNCH) POO10 FIX C.1. SO THAT I WILL NOT PUNCH) POO10 CONTROL INFORMATION) POO10 C.1. FOR AVAILABILITY TABLE) STORE PROCESSED CARD)	1584 1596 1600 1928 2262 2280 2282 2300 2302 2530 2554 880 940
0703 90 0187 0528 0700 24 0187 0285	0187 O OS	90 X2 24 P0011	X0011 X	NO. FIXED. YES. UNFIXED.	726 9 4 2
0386 69 0189 0142		69	SUBR6	PROCESS I BACKWARD	672
0487 69 0190 0441		69	SUB13	GET DYNAMIC LEVEL OF CORE ADDRESS	1268
0239 69 0192 0142	N 9X8	69	SUBR6	PROCESS I BACKWARDS	790
0291 69 0194 0142	N MISC	69	SUBR6	PROCESS I BACKWARDS	758
0192 69 0195 0305 0316 00 0195 0000	J P C8	69 00 0195	SUBR4 0000	PROCESS L BACKWARDS MODIFY BRINGING ORDER TO START NEW COL	792 1142
0393 69 0196 0400 0266 00 0196 0000	N 898 P C6	69 00 0196	SUBR5 0000	PROCESS D BACKWARDS TO MODIFY BRINGING ORDER FOR NEXT COL	780 1138
0144 69 0197 0150 0468 69 0197 0300 0460 65 0197 0520 0329 20 0197 0350 0510 65 0197 0527	C K C NO J 0197 C X1	69 ALOPT 69 ALOPT 65 ALOPT 20 ALOPT 65 ALOPT	X0003 X0010	IS IT AN MDF OPERATION IS D AN ACTUAL ADDRESS MULTIPLE EXIT ACCORDING TO KINO ALOPT STORE MODIFIED ALOPT MULTIPLE EXIT	460 686 694 712 718

D187 20 D197 D081 D450 65 D197 0251 0059 20 D197 D500 1094 65 D197 D301 D237 20 D197 D505 D266 65 D197 D351 D209 20 D197 D397 0317 65 D197 0287 D276 69 D197 0950 1247 69 D197 D105 1071 21 D197 D177 1084 2 1097 D200 8D02	D197 D197 O197 D197 D197	J J N MDDO9 N BL	2D ALOPT 65 ALDPT 2D ALOPT 65 ALDPT 2D ALOPT 2D ALOPT 65 ALOPT 65 ALOPT 69 ALOPT 69 ALOPT 21 ALOPT 21 ALOPT 24 ALDPT	F LNM XY EXITX 8002	ALOPT ALOPT ALOPT	STORE MODIFIED ALOPT ALOPT TO LDWER STORE MODIFIED ALOPT MDDIFY TO USE ROUTINE FOR UNFIXED D) MDDIFY TO USE ROUTINE FOR UNFIXED D) MDDIFY ALOPT AGAIN) STORE NEW ALOPT, AND JUMP BACK BRING ALDPT, AND JUMP BACK EQUIV DF NEW SYMBOL, SHDULD WE RESERVE BACKWARD L. GET ALOPT STORE ALL OPTIMIZING TAGS TAG IN CASE L IS UNDEFINED SYMBOL) BRING BACK A SET)	736 8D6 810 824 828 854 86D 866 1210 1712 18D6 1982 2526
0199 16 D2D2 1107 D348 15 D202 11D7		N AEB	16 25IXX 15 25IXX	BDT BDT		WHICH L IS LESS, MEASURED DN CIRCLE) WHICH L IS LESS, MEASURED DN CIRCLE)	844 846
D453 6D D206 DD57			6D	SB1DA		PUNCH CARD	592
D2D3 90 D2D7 DD58			9D	ND		IS THIS FIRST SET DF SEARCH)	426
DDD5 69 D2D8 DD61			69	SUBR3		IS L FIXED ADDRESS)	44D
04D7 16 D210 D115			16 MAX			IS STORAGE AREA FULL)	48D
0358 69 D211 0164		CA	69 SEN			PRESET TD STORE AFTER PROCESSING)	618
D311 65 D214 0113		N 2ND	65	SSB		USE I-COMP. BRING BLANB AND ORCEB	862
D463 45 0216 0417			45	ZP		D, ND	1098
D7D5 D1 D222 11D9		N FULL	01 D222			STOP BECAUSE DRUM IS PACKED	1698
D623 45 D226 016D			45	ROD1D		IF SO, MULTIBRANCH + EXIT FROM OUITT	57D
D773 21 D228 D481 0363 15 D228 D583	D228		21 P 15 P		P	MAKE SEVERAL VARIABLE ORDERS) MAKE SEVERAL VARIABLE ORDERS)	1D7D 1080
0232 24 D235 D388 D113 69 D235 0438	D235	N SSB	24 T1 69 T1		Т1	SAVE IN CASE I IS BLANK SPEC. SUBR. BRING BACK BLANB + ORCEB	8D0 868
D233 45 0236 DD37			45 YYY			D. NO. I. YES.	5D2
DD85 24 0238 0191 D189 69 0238 0241	D238	J	24 SAVEL 69 SAVEL		SAVEL	SAVE L FROM CARD THAT STARTED SRCH) BRING BACK L AND D)	624 674
0289 1D 0242 0547			1D SEND	A		BRING BACK A SET OF RESULTS)	92D
0593 69 D246 0249 0973 69 D246 0299 D417 69 D246 D349		N ZP	69 C1 69 C1 69 C1			MAKE SEVERAL VARIABLE ORDERS) MODIFY TO TAKE NEXT COLUMN OF TABLE) LAST LINE AND END OF WORD. MODIFY)	1D84 11D2 1112
D143 44 D247 D198			44	OUT		BRING BACK A SET)	562
D347 1D D25D 8002			10 Os	80D2		BRING BACK A SET)	656
D251 16 D254 D059 0287 15 0254 D209 038D 11 0254 D559		C XY	16 11STX 15 11STX 11 11STX			CHANGE ITS FIRST DIGIT TO 8 MODIFY ALOPT AGAIN) IS FIRST POSITION BLANK	8D8 858 1376
D557 1D D26D D215			10 BRNG			NOT 1ST CARD. MAKE COMP. CONST.)	546
D4D8 11 D261 D265		×	11 0			BRING BACK A SET)	65D
D361 10 D264 80D3			1D C4	80D3		MAKE VARIABLE BRINGING ORDER	1028
0513 11 0266 D331			11 C6	su		MODIFY TO TAKE FIRST LINE, SAME COLUMN	111D
D950 9D D271 0505			9D MDDD4			O. CASE WHERE WE OUPLICATE COMPUTATION	1212
D725 45 D278 0679			45	OUT		ARE LAST FOUR CHARACTERS OIGITS)	1454
D226 69 D279 D039			69	SUB14		GET OP+ C.I., TAGS+ OPTIM+ ALOPT+	572
0479 21 0284 0387 0411 60 0284 0389	0284	C OK	21 XXXXA 6D XXXXA		XXXXA	STORE INITIAL ADORESS TO BE RESERVED MAKE SEVERALVARIABLE ORDERS)	1D40 1D58
0333 96 0286 0657 D310 69 D286 0045		J	96 JUMP 69 JUMP	NO SUB20		D. STARTEO WITH I. I. WITH L. PROCESS O	58D 584
0587 65 029D 80D1 D6D6 16 D29D D345 D972 16 029D D445		N UND N OEF	65 Y 16 Y 16 Y	8001		BRINGING OROER INTO LOWER SYMB NOT IN TABLE. SUBTRACT Y DEFINED SYMBOL. SUBTRACT Y	1506 1518 1530
014D 98 D291 D145			98 MISC	899		MULTIPLE BRANCH ACCORDING TO TAGS)	742
D339 24 D292 ODD3 1335 65 D292 1337 0798 2D D292 1049	0292 0292		24 ORCEO 65 ORCEO 2D ORCEQ	REAOC MW B		FINISHED. SAVE SAVOR AS ORCEQ) DYNAMIC LEVEL OF LAST CORE ADORESS STORE DYNAMIC LEVEL FOR REFERENCE	938 2106 21 6 2

0998 20 02 1067 69 02	92 0177 92 0645	0292		20 69	OR CEO	EXITX	ORCEQ	STORE DYNAMIC LEVEL FOR REFERENCE STORE ORCEO FOR USE WHEN WE START FORW	2224 2240
0491 15 02					XXXX2	SB10C		ADD TO GIVE MODIFIED DYNAMIC LEFEL	1260
1039 20 02 0509 10 02	94 0167	0294	C A	10	XXXX2 XXXX2	XXXX1		LOCATION OF EQUIVALENT RELATIVE TO E1 MAKE STORING ORDER)	1344 1358
0629 21 02 0589 10 02	94 0399	0294			XXXX2 XXXX2			ALSO STORE FIRST LETTER OF ADDRESS) FIRST CHARACTER INTO UPPER	1444 1470
1263 20 02 1341 10 02		0294			XXXX2 XXXX2		XXXX2	STORE THE COUNT WHAT CELL DID WE RESERVE)	1710 1754
1231 20 02 1086 15 02	294 1297	0294	J	20	XXXX2 XXXX2	В	XXXX2	STORE DYNAMIC LEVEL, RIGHT END WORD PERHAPS MODIFY DYNAMIC LEVEL)	1994 2150
0145 69 02			N 899	69		SUBR5		PROCESS D BACKWAROS	772
0750 21 03		0304	R XX	21			Uн	REPLACE DIGIT OF AVAIL. WORD BY W)	998
0337 10 03			N SHX	10	UH	SPR		REPLACE DIGIT OF AVAIL. WORD BY W) PROCESS D FORWARDS	1008 766
				69		SUB20			
0657 69 03			C NO	69	_8	SUB19		STARTED WITH L. OR NOT FIRST. PROC. L	582
0563 11 03				11	C8	SU		LAST LINE AND END OF WORD. MODIFY)	1122
0214 69 03			J	69		SUBR6		PROCESS I BACKWARDS AGAIN	864
0115 45 03				45		QUITT		IFSO, QUIT SEARCH	482
0217 14 03 0267 14 03					501XX 501XX			SAVE DYNAMIC LEVEL OF L FROM 0) WHICH L IS LESS, MEASUREO ON CIRCLE)	820 8 36
0649 19 03 1017 15 03				19	501XX 501XX			WHAT CELL OIO WE RESERVE) ADD 50 TO MAKE SURELY POSITIVE	1756 1904
1085 14 03 1264 10 03	20 1272		C CP	14	501XX 501XX			NEW LEVEL, MOOULO 50 IN UPPER ADVANCE IT	1914 2390
0569 10 03					QSB	8003		MAKE DRUM AVAILABLE)	978
0671 46 03	24 0225			46		TP		D. NOT LAST LINE.	1022
0272 65 03	25 0611		R M0005	65		SUB11		NEW SYMBOL. FIND BEST EQUIVALENT	1194
0723 10 03				10				REPLACE OIGIT OF AVAIL. WORD BY W)	1004
0533 24 03		0326	C RU	24			W	STORE 0 OR 1	1038
0653 90 03				90	×1	X0004		FIRST, UNFIXEO. OTHER, FIXED.	702
0379 45 03	332 0483			45		OVR		BRING BACK A SET OF RESULTS)	916
0681 11 03	334 0539			11	9060			SUBTRACT 9060	1398
0504 90 03	35 0459			90	SB10C			0. WE SHOULD STORE THIS OYNAMIC LEVEL	1274
0383 96 03	336 0188			96		В		D. WITH I. I. WITH L.	610
0034 99 03	338 0239		N XX8	99		9X8		MULTIPLE BRANCH ACCORDING TO TAGS)	744
0637 65 03	840 8001			65		8001		BRINGING ORDER INTO LOWER	1514
0338 98 03	341 0393			98	888	898		MULTIPLE BRANCH ACCORDING TO TAGS)	746
0743 65 03 0737 65 03			SW J OFF	65 65		SWOF SWOF		NOT PERFORMEDJUST FOR OPTIMIZING HAVE WE REACHED TOP OF TABLE	1646 1648
1020 20 03	846 8001	0346	C SAI	20	AI	8001	AI	STORE BRINGING ORDER, AND DO IT	1656
0739 65 03 0516 65 03	346 0651		J OFB J ON	65	AI			START BACKWAROS SEARCH. HOW FAR AFTER RESTART. BRING BRINGING ORDER	1670 1684
1225 15 03 0755 65 03			C SKP	15 65				NEW AVAILABILITY WORD INTO ORUM) ALL CASES. WHAT OID WE RESERVE)	1732 1740
0293 44 03	347 0248			44		OUT		BRING BACK A SET)	654
0245 46 03	348 0199			46	AEB			WHICH L IS LESS+ MEASURED ON CIRCLE)	842
0449 46 03	52 0791			46		FULL		I+ TABLE IS FULL	1526
0198 20 03 0206 65 03		0353	TUO N		VAR VAR	LOOP	VAR	STORE VARIABLE ORDER BRING VARIABLE ORDER: AND REPEAT	566 594
0252 11 03				11				STORE PROCESSEO CARO)	884
0753 69 03			J	69		SUBR4		PROCESS L BACKWARDS FROM D	814
0511 22 03		0359			SPR		SPR	MAKE SEVERAL VARIABLE ORDERS)	1090
0225 65 03	359 0413	0359	N TP	65	SPR SPR		SPR	BOTTOM LINE OF TABLE MOOIFY TO TAKE NEXT COLUMN OF TABLE)	1094 1106
0561 24 03					SPR		SPR	LAST LINE AND END OF WORD. MODIFY)	1118
0757 69 03	360 0013			69	BRNG			BRING BACK A SET)	636
1061 91 03	364 0688			91		FO		O, IT IS A BRANCH OPERATION	1812
0112 11 03	865 8003			11	OSA	8003		CLEAR REGION AND SYMBOL TABLES)	960

0663 46	0366 0467	,		46	RC		O. ORUM. I. CORE.	1386
0775 15	0378 8002	2		15	8002		MAKE BRINGING OROER	1566
0429 10	0382 8003	3		10	8003		MAKE ORUM AVAILABLE)	970
0731 15 0 0741 24				15 T 24 T	8002	т	ADVANCE LOWER AND BRING ANOTHER PRESET T AS POSITIVE 1)	1432 1504
0643 20				20 T		Ť	SHORT. PRESET T AS -1)	1512
0433 96	0386 0288	3		96	L		O, WITH I. I, WITH L.	670
0388 69				69 ORCEB		00.550	SAVE IN CASE I IS CORE)	802
0600 2 4 0	0391 0335	0391		24 ORCEB 20 ORCEB	SB10C	ORCEB	SPEC. SUBR. BRING BACK BLANB + ORCEB STORE OYNAMIC LEVEL OF CORE ADORESS	874 1206
0374 69 (R J0007	69 ORCEB	J0004		CORE. BRING OYNAMIC LEVEL	1320
0439 15				15 SS			SYMBOL-STORING OROER)	1332
0591 10				10 P3	A		MAKE STORING OROER	1362
0642 16 (0395 0449)		16 ZTABL				1524
0194 69 () J	69 LNM 69 LNM	SUBR5 SUBR6		PROCESS O BACKWAROS PROCESS I BACKWAROS	760 768
0101 65	0397 0201		J	65 LNM	SUB22		SAVE ORCEQ	776
0749 92 (1051 92 (92 SHOP 92 SHOP			O, IT IS A SHIFT OPERATION O, IT IS A SHIFT OPERATION	1800 1808
0302 10	0405 0309			10 QA			CLEAR REGION AND SYMBOL TABLES)	956
0953 69 (0406 0305	•	J	69	SUBR4		PROCESS L BACKWAROS FROM I	832
0506 11 0				11 20001			IS INITIAL ADDRESS LESS THAN 2000	1044
0777 11 0 0676 10 0	0409 0713	1		11 2000I 10 2000I	RES		SUBTRACT 2000 RESTORE RELOCATED ORUM ADORESS	1384 1392
0964 16 (1082 15 (с со	16 2000I 15 2000I	Q0007		CORE OR ORUM RESTORE THE 2000 AND JUMP BACK	2364 2372
0907 16	0410 0315	i		16 QF			IS THIS LAST SET)	664
0558 46 (0411 0212	!		46 OK			I . LAST ONE WOULD BE OVER 1999	1050
0559 46	0412 0613			46	FXT		I. FIRST IS NON-BLANK. FIXED ADDRESS.	1378
0913 46 (46 SYM	L00		D. AODRESS IS SYMBOLIC.	1450
0485 44 0				44 SYM 46 SYM			ARE LAST FOUR CHARACTERS DIGITS) O, FIRST IS SPEC. CHAR. SYMBOLIC	1458 1480
0923 69 (0426 0441		R C0006	69	SUB13		800X AOORESS. GET OYNAMIC LEVEL	1252
0324 10 (0427 0331			10 800	SU		RESTORE, AND TAKE WORD FROM NEXT LINE	1024
1275 15	0428 8002	:		15	8002		MAKE BRINGING OROER	1840
0432 65 0 0442 65 0				65 LSYMB 65 LSYMB			SYMBOL-STORING OROER) LOCATION OF EOUIVALENT RELATIVE TO E1	1330 1338
0345 20 0	0435 0588	0435		20 LSYMB			STORE AODR OF SPACE RELATIVE TO START	1520
				20 LSYMB		LSTMD	AOORESS OF SYMBOL RELATIVE TO START	1534
1291 15 (15	8002		MAKE SHIFTING OROER	1726
0244 24 (24 T2 69 T2		Т2	SAVE IN CASE I IS CORE) SPEC. SUBR. BRING BACK BLANB + ORCEB	804 872
0957 69 (0460 0063	1		69	SUBR9		ANALYZE I. FOR TYPE OF AGORESS	692
1310 44 0	0464 0514	•		44	UM		0 . O TAG IS NON-ZERO	1954
0963 46 (0466 0416	•		46	SYM		I. FIRST CHAR IS OIGIT. AOOR SYMBOLIC	1476
0315 45 0	0468 0319	•		45 NO			0 . NO. I . YES.	666
0931 96 0	0484 0736	•		96 01			I . AOORESS IS BACKWARO I OR FORWARO L	1614
0459 20 0				20 SAVOR	SB10C	SAVOR	STORE OYN LEV OF CORE, AND FINISH UP	1276
0645 2 8 0 0483 69 0	0486 0339	'	N OVR	24 · SAVOR 69 SAVOR	8002	SAVOR	STORE ORCEO FOR USE WHEN WE START FORW FINISHED. SAVE SAVOR AS ORCEO)	936
0285 11 (0488 0493		X	11 0			BRING BACK A SET OF RESULTS)	928
0787 97 (0490 0742		N 9	97 FIB0	BL		O. FORWARD I. I. BACKWARO L.	1784
0489 14 0 0638 14 0	0492 1029 0492 0904			14 20XXX 14 2DXXX			LOCATION OF EQUIVALENT RELATIVE TO E1 DIVIDE BY 2	1340 1536
0443 44 (0497 0398			44	OUT2		STORE PROCESSED CARO)	888
0445 16 0	0498 0754			16 JBRL			SUBTRACT INITIAL BRINGING ORDER	1532
0099 69 (0502 0740		R 0099	69	SUB		RBR ENTRY. TO SUBROUTINE	2454

0303 90 0507 0258		90	SKP	D, ONLY ONE.	534
1057 69 0510 0063		69	SUBR 9	ANALYZE O	716
1009 45 0512 1113		45	MAX	I . WE HAVE REACHED TOP OF TABLE	1652
0162 16 0515 0619 0431 69 0515 0533 0669 16 0515 0733 0597 61 0515 1069 0691 16 0515 1269 0352 60 0515 1269 1277 15 0515 8002 1260 65 0515 1211 0464 15 0515 0514 1042 65 0515 0178 0698 66 0515 0178	C PAKT	16 110TH 69 110TH 16 110TH 61 110TH 16 110TH 15 110TH 65 110TH 15 110TH 65 110TH 66 110TH	RU OON DON 8002 BT UM EXITY EXITY	REDUCE NUMBER YET TO BE DONE) BRING UNITY TO INDICATE UNRESERVATION MOOIFY TO ENO WITH 1999) MOOIFY EXIT AND PREPARE TO OUIT GET EQUIVALENT OF REGIONAL ADORESS) MOOIFY EXIT, AND PREPARE TO OUIT MOOIFY EXIT) COUNT OF I TAGS IN LOWER COUNT OF TAGS IN LOWER UNIT CORRECTION TO OYNAMIC LEVEL IF 8001, CORRECTION IS -1	1014 1036 1054 1438 1492 1528 1706 1950 1956 2010
1113 69 0516 1070 1213 69 0516 1120	N MAX N MIN	69 ON 69 ON		AT TOP. SET SWITCH ON) SECONO PART. BACKWARDS. CHANGE SWITCH	1678 1692
0763 44 0517 0618 0618 46 0517 0972		44 NZ 46 NZ	DEF	0, IT WAS NOT RIGHT ONE 0, IT WAS NOT RIGHT ONE . 1, IT AS.	1424 1426
0530 91 0526 0525	R X0013	91 X0009	X0008	CORE. BRANCH. LIKE BLANK. ARITH. UNF	732
0981 97 0534 0786		97	BAK	D+ FORWARD. I+ BACKWARD.	1632
0633 65 0536 0220 0908 65 0536 0271 0711 65 0536 0921 0911 65 0536 0371 0674 65 0536 0591 0641 20 0536 0591 0641 20 0536 0591 1269 23 0536 0704 0776 23 0536 0704 1031 20 0536 1078 1033 16 0536 0992 1347 16 0536 0992 1347 16 0536 0992 1347 65 0536 0472 1215 65 0536 0472 1215 65 0536 0472 1215 65 0536 0472 1215 65 0536 0472 1215 65 0536 1289 0128 20 0536 1289 0129 20 0536 1289 0130 20 0536 1289 0130 20 0536 1289 0130 20 0536 1289 0130 20 0536 1289 0130 20 0536 1289 0130 20 0536 1289	J PRE	65 EOUIV 65 EOUIV 65 EOUIV 65 EOUIV 65 EOUIV 65 EOUIV 20 EOUIV 15 EOUIV 23 EOUIV 24 EOUIV 16 EOUIV 65 EOUIV 65 EOUIV 65 EOUIV 65 EOUIV 65 EOUIV 65 EOUIV 60 EOUIV	F0003 M0004 C0004 J0004 ABS ABS EXITY L0004 00004 10004 00003 S0 SD SD SD	BRING EOUIV AND MULTIBRANCH EOUIVALENT TO LOWER. MULTIBRANCH BRING EOUIVALENT. MULTIBRANCH BRING EOUIVALENT. MULTIBRANCH BRING EOUIVALENT USE 1-POSITION. BRING EOUIVALENT EOUIV STORE THESE 4 OIGITS GET EOUIVALENT OF REGIONAL ADDRESS } EOUIV STORE EOUIVALENT OF SYMBOL EOUIV STORE EOUIVALENT OF SYMBOL EOUIV STORE EOUIVALENT OF SYMBOL EOUIV STORE THIS ADDRESS IN EOUIV BOTH. SUBTRACT THE BOOX ADDRESS SUBTRACT THE ADDRESS IN OUESTION BRING EOUIVALENT. MULTIBRANCH EOUIV OLO SYMBOL. STORE I AS NEW EOUIV EOUIV NEW SYMBOL. STORE I AS NEW EOUIVALENT EOUIV ORE. STORE I AS ITS EOUIVALENT. EOUIV ORE. STORE I AS ITS EOUIVALENT. EOUIV OTHER. STORE I AS THE EOUIVALENT.	1152 1178 1228 1296 1352 1360 1468 1490 1494 1554 1760 2004 2014 2074 2122 2184 2318 2344 2346 2348 2350 2352
0385 69 0538 0441		69	SUB13	FINO DYNAMIC LEVEL OF CORE ACORESS	1202
1037 14 0540 1048		14 42NO		SHOULO WE INTERCHANGE ACCENOS)	1872
0539 46 0542 0977		46	BAO	I . RELOCATED CORE ADDRESS TOO HIGH	1400
0942 16 0545 1085 0514 20 0545 0598 1337 15 0545 0335	0545 C UM C MW	16 COUNT 20 COUNT 15 COUNT	CP SB10C	IF BACKWARO L. SUBTRACT TAG-COUNT } COUNT STORE TAG-COUNT CORE OR DRUM. AOO TAG-COUNT TO DYN LV	1912 1958 2108
1092 45 0546 0698		45 NZ		0. AODRESS IS NOT 8001	2016
0296 15 0549 0954		15 601		INITIAL OF VARIABLE BRINGING OROER	1638
0248 20 0553 0256 0009 65 0553 0907 0570 65 0553 0243	0553 N OUT J	20 VAR 65 VAR 65 VAR	LOOP	VAR STORE VARIABLE OROER IS THIS LAST SET) BRINGING OROER. BACK FOR ANOTHER CARD	658 662 894
0451 10 0554 0509		10 P2	A	MAKE STORING OROER)	1356
0273 01 0555 0273 0275 01 0555 0275	R M0006 R M0008	01 0555 01 0555	M0006 M0008	800X AODRESS. STOP THE MACHINE OTHER AOORESS. STOP MACHINE	1198 1208
1103 65 0556 0611		65	SUB11	FIND BEST EOUIVALENT TO BLANK	1188
1107 46 0560 0311	с вот	46	2NO	0. WE WILL USE ONE MEASURED FROM O	848
1311 15 0564 8002		15	8002	BRINGING OROER	2042
0262 10 0565 0331		10 C3	SU	MAKE SEVERAL VARIABLE ORDERS)	1092
0615 69 0568 0677		69	INOEX	TO SUBROUTINE 18 TO INDEX	1310
1081 60 0584 1089	N YES	60 9	AX	MORE TAGS INTO UPPER	1978
0781 44 0585 0686		44	SHRT	O+ LONG SYMBOL	1500
1237 10 0590 8003		10	8003	MAKE BRINGING OROER	1962

				MANE -DANGING DDOED	
0639 10 0592 8003		.0	8003	MAKE BRINGING DROER)	1484
1289 69 0594 0661		.9	SUBR7	STORE SYMBOL AND EDUIVALENT IN TABLE	2354
1292 69 0595 1025		.9	SUB2R	RESERVE ADDRESS	2090
1345 45 0596 0646			SDD	IF D IS BLANK, WE SHOULD STDRE ZERD	2622
0493 44 0597 0448			DUT	BRING BACK A SET OF RESULTS)	930
0396 15 0599 1104		.5 602		INITIAL BRINGING DRDER)	1662
0300 95 0603 0255		5 SHX		D, ND. I, YES.	688
0204 11 0607 0161		.1 D		BRING BACK A SET)	558
1307 11 0610 0415		.1 DB		MAKE DRUM AVAILABLE)	974
1059 45 0612 1213		.5	MIN	D. WE ARE NOT BACK TO START YET	1674
0269 60 0622 0627 0977 60 0622 0177 0419 60 0622 0627	N BAD 6	0 87THX 0 87THX 0 87THX	SB10B EXITX SB10B	N. G. DMIT PUNCHING MDDIFIED ADDR TOO HIGH. 8000 TD UPPER N.G. FIX TD OMIT PUNCHING	1182 1412 2078
0921 69 0624 0677	N C0004 6	9	INDEX	DRUM DR EOUIVALENT. INDEX IF TAGGED	1244
0922 65 0625 0611	R C0005 6	5	SUB11	NEW SYMBOL. FIND BEST EQUIVALENT	1248
0772 90 0626 0369	9	0	J0002	D. DRUM IS NDT FULL	1304
0030 69 0633 0063	6	9	SUBR9	TD SUBRDUTINE 9 TD ANALYZE THE ADDRESS	1150
0482 45 0636 0537	4	5 ABC		I, THE ADDRESS IS BLANK	1436
1287 45 0640 1042	4	5 XY		I . 8002-8003 + WRONG PARITY	2008
1339 45 0644 0694	4	5 ALL		I. IT IS ANDTHER RBD CARD	2406
0497 10 0650 8003	1	.0 QS2	8003	STDRE PROCESSED CARD)	890
0399 44 0654 0704	4	4	ABS	I . ZERD . ADDRESS WAS ABSOLUTE	1472
0701 45 0655 0705	4	5	FULL	I. THERE IS NO AVAILABLE LD CATION.	1688
0403 90 0657 0308	9	0 NO		D. IT IS NOT	576
1053 21 0658 0461 0401 10 0658 0363		1 X 0 X	×	MAKE SEVERAL VARIABLE DRDERS) MAKE SEVERAL VARIABLE ORDERS)	1064 1078
1105 93 0660 0710 0656 93 0660 1061		3 XAS 3 XAS		D, IT IS AN INDEXING DPERATION D, IT IS AN INDEXING DPERATION	1802 1810
0531 01 0666 0531 1312 69 0666 1024		0666 9	X0014 SUBR8	DTHER. ERROR. SHDULD NDT BE HERE. PRDCE5S D	734 2268
0665 45 0668 1219	4	5	NG	I . REGIDN IS UNDEFINED	1488
0919 60 0672 0627 0470 60 0672 0627		0 88THX 0 88THX	SB10B SB10B	N G. OMIT PUNCHING N.G. DUIT AND DMIT PUNCHING	1232 2126
0620 60 0673 0057	C LOOP 6	0	SB10A	TD SUB 10A TD PUNCH DNE CARD	910
0372 65 0675 0611	R JD005 6	5	SUB11	NEW SYMBDL. FIND BEST VALUE	1314
1123 46 0676 0977	4	6	BAD	I . RELDCATEO DRUM WILL EXCEED 1999	1390
0280 69 0683 0586	6	9	SUB17	CDRRECTION TO DYNAMIC LEVEL	1256
1216 46 0684 0029	4	6	0029	IF A DIGIT, TO BLR WITHOUT DESIGNATING	2480
0484 69 0687 0390	N DI 6	9 F		PREPARE EXIT AND GD TO SUBROUTINE 13)	1618
0735 97 0688 0490 0364 99 0688 0490		7 FD 9 FD	FIBD FIBD	D. FDRWARD D. I. BACKWARD D. I. BACKWARD L. BRANCH. UNFIXED D	1782 1814
1334 15 0695 1299 0745 15 0695 1349 0795 15 0695 0652	1	.5 C3 .5 C3 .5 C3		MDDIFY IDENTIFICATION OF WORD MDDIFY IDENTIFICATION OF WORD MDDIFY IDENTIFICATION OF WDRD	2562 2566 2570
0597 10 0700 0547	1	.o os	A	BRING BACK A SET DF RESULTS)	932
0945 10 0702 8003 0995 10 0702 8003 1045 10 0702 8003 1095 10 0702 8003	1 1	.0 C6 .0 C6 .0 C6	8003 8003 8003 8003	MDDIFY BRINGING ORDER, AND BRING MDDIFY BRINGING DRDER, AND BRING MDDIFY BRINGING DRDER, AND BRING MODIFY BRINGING DRDER, AND BRING	2576 2580 2584 2588
0503 90 0707 0358	9	0	A	IF NDT. JUMP AHEAD	606
0354 69 0708 0511 0413 16 0708 0463		9 C2 .6 C2		MAKE SEVERAL VARIABLE DRDERS) IS IT ALSD RIGHT END DF WDRD	1088
0958 69 0711 0063		9 PRE	SUBR9	ANALYZE THE ALPHABETIC D ADDRESS	1226

0926 69 0711	0661	N C0009	69 PRE	SUBR7		STORE EQUIVALENT OF NEW SYMBOL	1282
0715 15 0718	8002		15	8002		MAKE RRINGING OROER	1540
0369 60 0722 0573 60 0722		R J0002 R I0002	60 89THX 60 89THX	SB10B SB10B		N.G. OMIT PUNCHING N.G. QUIT AND OMIT PUNCHING	1300 2188
1223 10 0726 0968 15 0726 0946 20 0726	1082	6 C SCD	10 COIFF 15 COIFF 20 COIFF	CD SETCC	CDIFF	AOD RELOCATION AMOUNT ADD CORE RELOCATION AMOUNT STORE CORE RELOCATION AMOUNT	1396 2368 2634
0924 69 0727	0677	R C0007	69	INOEX		CORE ADDRESS. INDEX IT	1262
1224 90 0728	0419		90	L0002		O. DRUM NOT FULL. I. DRUM IS FULL.	2082
0929 46 0732	0933		46 DRM			I + CORE. D, ORUM.	2052
0779 20 0733 1010 15 0733 0917 16 0733	0987	13	20 B 15 B 16 B	P	В	SHOULO WE INTERCHANGE ADDENDS) SHOULO WE INTERCHANGE ADDENDS) INTERCHANGE AND MAKE NEGATIVE)	1860 18 6 8 1880
0532 95 0735	0787		95	9		D, D ADORESS. I, FORWARD I OR BACKW L	1780
0534 69 0737	0440		69 OFF			FORWARD. SET SWITCH OFF FOR 1ST PART	1634
0786 69 0739	0692	N BAK	69 OFB			GOING BACKWARO. SET SWITCH OFF)	1,658
0440 24 0743 0692 24 0743 1070 24 0743 1120 24 0743	0396 074 0446 074	3 3	24 SW 24 SW 24 SW 24 SW		SW SW SW	FORWARO. SET SWITCH OFF FOR 1ST PART GOING BACKWARO. SET SWITCH OFF) AT TOP. SET SWITCH ON) SECONO PART. BACKWAROS. CHANGE SWITCH	1636 1660 1680 1694
1046 44 0752			44	REAOC		D. WE ARE NOT CONE.	2594
0500 69 0753			69	SUBR5		PROCESS O BACKWARDS	812
1100 90 0755	0905		90 SKP			D. SKIP BECAUSE COMP IS DOUBLE	1714
0454 69 0758	0561		69 C7			LAST LINE AND END OF WORD. MODIFY)	1116
1058 65 0761	0611	N BB1	65	SUB11		GET BLANK O OYNAMICALLY FROM I	1240
0512 15 0765	1020		15 800	SAI		AOVANCE VARIABLE BRINGING ORDER	1654
1265 65 0768	0611	N DNB	65	SUB11		USUAL CASE. I BLANK AND NOT D.	2200
0216 15 0769	0973		15 C5			MODIFY TO TAKE NEXT COLUMN OF TABLE)	1100
1220 14 0774	1021		14 4IXXX			WHAT CELL OID WE RESERVE)	1746
0474 69 0778	0441	R D0006	69	SUB13		800X AOORESS. FINO DYNAMIC LEVEL	2144
0767 92 0785	1222		92 SEO			JUMP UNLESS OPERATION 80.82. OR 88	1846
0588 46 0791	0642		46 FULL			O. TABLE IS FULL	1522
0937 20 0792 1351 66 0792		N OK	20 INO 66 INO	Р	INO	BACKWARO. SHOULO WE INTERCHANGE AOOND MAKE NEGATIVE. BUT OO NOT INTERCHANGE	1854 1882
0690 69 0794	1025		69	SUB2R		RESERVE 0000	2430
0746 45 0796	0946		45	SC0		JUMP IF I IS BLANK	2630
0590 65 0800 0748 94 0800		J	65 0800 94 0800			BRING OPTIMIZING AOOENOS ANO TAGS IF BLANK O AND MDF. STOP MACHINE	1964 2130
0778 00 0808 1243 00 0808))	00 0808 00 0808			TAGS AND EXIT FOR USE IN SUBR 11 TAGS AND EXIT FOR SUBROUTINE 13	2146 2160
1293 00 0809	0998	J	00 0809			TAGS AND EXIT FOR SUBROUTINE 13	2222
1115 00 0888 1276 00 0888) J	00 0888 00 0888	00001 00009		TAGS AND EXIT FOR SUBROUTINE 11 TAGS AND EXIT FOR USE IN SUBR 11	2134 2142
0768 00 0889 0979 00 0889) J	00 0889 00 0889	I 0001 I 0009		TAGS AND EXIT FOR SUBROUTINE 11 TAGS AND EXIT FOR SUBR 11.	2202 2210
1342 00 0890	0418	J	00 0890	L0001		TAGS AND EXIT FOR USE IN SUBR 11	2100
0249 22 0901 0299 22 0901 0349 24 0901	0404 090)1	22 0901 22 0901 24 0901		0901	MAKE SEVERAL VARIABLE OROERS) MOOIFY TO TAKE NEXT COLUMN OF TABLE) LAST LINE AND END OF WORD. MOOIFY)	1086 1104 1114
0053 60 0902 0055 60 0902			60 0902 60 0902			IS O INOEXEO IS O INOEXEO	386 464
1006 21 0902 1211 10 0902	1056 090	C BT	21 0902 10 0902		0902	STORE O TAG O TAG INTO UPPER	1940 1952
0564 65 0902	0662	j "	65 0902			BRING APPROPRIATE TAG	2044
0318 65 0903 0628 20 0903)3	65 0903 20 0903		0903	IS I INDEXED STORE I TAG	484 19 4 6

0949 20 0906 1010 1052 66 0906 1111	0906	20 A 66 A		Α	SHOULO WE INTERCHANGE AOOENOS) INTERCHANGE AND MAKE NEGATIVE)	1866 1876
0455 69 0908 0063 0505 69 0908 0661 0426 00 0908 0280 0190 00 0908 0344	j	69 PRE 69 PRE 00 0908 00 0908	SUBR9 SUBR7		ANALYZE THE AOORESS USUAL CASE. STORE SYMBOL AND EQUIV TAGS AND EXIT FOR SUBROUTINE 13 TAGS AND EXIT FOR SUBROUTINE 13	1176 1214 1254 1270
0538 00 0909 0342	J	00 0909			TAGS AND EXIT FOR USE IN SUBR 13	1204
1108 69 0911 0063 0368 69 0911 0661	N J0001	69 PRE 69 PRE	SUBR9 SUBR7		ANALYZE ALPHABETIC I STORE EOUIVALENT OF NEW SYMBOL	1294 1298
0612 15 0915 1020		15 599	SAI		RESTORE AND MODIFY	1676
0452 10 0916 0980		10 Q			OUPLICATE INTO AVAILABILITY TABLE)	2414
0475 69 0928 0677	R 00007	69	INOEX		CORE ADDRESS. INDEX IF TAGGED	2152
0766 16 0930 1339		16 941			IS THIS ANOTHER RBO CARO)	2404
0582 97 0935 0937		97 P			0, FORWARO. I, BACKWARO.	1852
1240 69 0944 0042		69	SUB19		PROCESS L. IF REGIONAL OR SYMBOLIC	2532
0550 69 0953 0142		69	SUBR6		PROCESS I BACKWAROS	830
0751 69 0955 1209		69 STR			NEW AVAILABILITY WORD INTO DRUM)	1734
0954 20 0959 0462 1104 20 0959 0562 0655 15 0959 1020	0959 0959	20 BP1 20 BP1 15 BP1	SAI	BP1 BP1	STORE VARIABLE BRINGING OROER INITIAL BRINGING OROER) RESTORE AND MODIFY	1640 1664 1690
1072 90 0976 1077		90	PAKT		I, YES.	1610
1274 90 0978 0573		90	10002		I, ORUM IS FULL	2196
0576 65 0979 0611	R I0005	65	SUB11		NEW SYMBOL. FINO BEST VALUE.	2208
1078 69 0982 0677		69	INOEX		INOEX O	2272
0761 00 0988 0918 0625 00 0988 0926	n n	00 0988 00 0988	C0001 CD009		TAGS AND EXIT FOR SUBRDUTINE 11 EXIT AND TAGS FOR SUBROUTINE 11	1242 1250
0556 00 0989 0268 0325 00 0989 0276	J	00 0989 00 0989	M0D01 M0009		TAGS AND EXIT FOR SUBROUTINE 11 TAGS AND EXIT FOR USE IN SUBROUTINE 11	1190 1196
0675 00 0990 0368 0084 65 0990 8002	J R 0084	00 0990 65	J0001 8002		TAGS AND EXIT FOR SUBROUTINE 11 ADDING ORDER TO LOWER	1316 2498
0797 15 1000 0555		15 P1			MAKE BRINGING DROER)	1346
0983 90 1001 0738		90 MOFLL			O. START SEARCH. I. WE ARE DN QUITT	2096
09D0 65 1003 0508 0619 20 1003 0456 0387 20 1003 0506 0166 10 1003 0558 0719 20 1D03 0411	R 0900 1003 1003	65 N 20 N 20 N 10 N 20 N	DK	N N	HAVE WE FINISHEO REQUEE NUMBER YET TO BE OONE) STDRE N-1 UPPER, LAST AODRESS - 2000 MDDIFY TO ENO WITH 1999)	1010 1016 1042 1048 1056
1001 69 1004 0107	N MDFLL	69 L	A		STARTEO WITH NEW-SYMBDL L	402
1002 44 1005 0606	C LDDP	44	UNO		I, SYMBOL IS NOT IN THE TABLE	1420
1353 90 1008 1058		90	BB1		D. THERE WAS A BLANK BACKWAROS L	1236
1060 44 1014 0414		44	EVN		O, DPREG WAS ODD. I, EVEN.	1890
0712 69 1015 0063 0418 69 1015 0661	N L0001	69 PRE 69 PRE	SUBR9 SUBR7		ANALYZE L-ADDRESS SUB 11 FOUNO EOU DF SYMB. RESERVE	2072 2076
1114 69 1018 1025		69	SUB2R		RESERVE FIRST CELL IN BANO	2382
0366 10 1019 1123 1317 15 1019 1082 0502 10 1019 1232 0646 20 1019 0696	N D J 1019 C S00	10 DOIFF 15 DOIFF 10 DDIFF 20 DDIFF	CO ZQ	DDIFF	ORUM. AOD RELOCATION AMOUNT AOO ORUM RELOCATION AMDUNT ADO RELOCATION AMOUNT STORE ORUM RELOCATION AMOUNT	1388 2370 2456 2626
1219 61 1022 1069 0635 15 1022 1027 0967 14 1022 1060 1297 14 1022 1322	C NG	61 2IXXX 15 2IXXX 14 2IXXX 14 2IXXX	DDN		MDOIFY EXIT FOR N G SYMBDL AOVANCE CARO NUMBER) WHICH DNE OD WE USE) OIVIDE DYNAMIC LEVEL BY 2	1558 1590 1888 1996
0918 20 1023 0376 0728 65 1023 0421 0469 20 1023 0476 0572 20 1023 0577 0978 65 1023 0579	1023 N CODO1 1023 N D0001 1023 N I0001	20 BLANK 65 BLANK 20 BLANK 20 BLANK 65 BLANK	A LODO 4 00008 I 0006 I 0008	BLANK	STORE EQUIV OF BLANK FOR FORWARD L USE PROPER VALUE FOR BLANK AGGRESS STDRE EQUIV OF BLANK FOR REFERENCE STORE EQUIVALENT OF BLANK FOR REFERENC MAKE BLANK I EQUAL TO BLANK 0	1230 2084 2124 2186 2198
0575 69 1028 0677	N 10004	69	INOEX		ORUM AODRESS. INOEX IF TAGGEO	2204
0422 69 1030 0983	R L0005	69 1030			NEW SYMBOL. WHERE ARE WE	2094

0047 24 1030 0033	1030 1030 1030	СА	24 1030 24 1030 24 1030 69 1030 69 1030 69 1030 69 1030 69 1030		1030	TAG IN CASE L IS UNDEFINED SYMBOL) DELETE DUITT TAG) STORE TAG TELLING HOW SEARCH STARTED IF SD, WHERE OID SEARCH START WHERE DID SEARCH START IF SD, WHERE DID WE START IF SD, WHERE DID SEARCH START IF SD, WHERE DID SEARCH START	2524 374 404 428 536 578 608 668
1278 69 1032 0677			69	INDEX		INDEX I	2292
0640 65 1043 1347		N XY	65 8001			8001 INTO RIGHT END LOWER	2012
1041 69 1044 1047 0008 69 1044 0047 0139 69 1044 0297 0234 69 1044 0647 0270 69 1044 0697 0709 15 1044 0499 0021 69 1044 1298		J R M0003 C SU810	69 81STX 69 81STX 69 81STX 69 81STX 69 81STX 15 81STX 69 81STX			RESTORE FIRST CARD TAG) DELETE OUITT TAG) CHANGE TAG TO SECOND-CARO TAG) PRESET DRUM TAG) 8LANK. CHANGE FIRST-CARD TAG) C.I. TO PUNCH X-9) BLA ENTRY. CHANGE DRUM TAG	366 372 588 964 1184 1582 2446
1047 24 1050 0160 0056 69 1050 0203 0017 24 1050 0253 0026 69 1050 0303 0279 69 1050 0403 0297 24 1050 0453 0019 69 1050 0503 0067 24 1050 0558 0519 69 1050 0653 0526 69 1050 0703 0697 24 1050 1103 0920 69 1050 1353 0344 69 1050 0504 0201 69 1050 1062	1050 1050 1050 1050 1050	N OUITT J N BACKW R X0002 R X0009 R C0003 N SUB22	24 1050 69 1050 24 1050 69 1050 69 1050 24 1050 69 1050 24 1050 69 1050 24 1050 69 1050 69 1050 69 1050 69 1050	R0010	1050 1050	RESTORE FIRST CARD TAG) MULTIBRANCH 1S THIS FIRST SET OF SEARCH) CHANGE FIRST-CARD INDICATOR TD 2ND) WAS THERE ONLY DNE SEARCHED CARD IS THIS FIRST OUITIT SET CHANGE TAG TD SECOND-CARD TAG) WAS THERE JUST ONE SEARCH CARD START DN L. FIRST-CARD TAG) BLANK ADDRESS. IS THIS FIRST CARD BLANK IS THIS FIRST CARD CHANGE FIRST-CARD TAG) BLANK ADORESS. WAS THERE BLANK BACK L FIRST-CARD TAG FIRST-CARD TAG	368 424 490 532 574 590 604 616 700 724 1186 1234 1272 2236
0551 16 1054 1009 0496 65 1054 1020		SWOF	16 799 65 799	SAI		SUBTRACT END DF TABLE START BACK FROM TOP DF TABLE	1650 1696
0659 44 1063 0314			44	LH		0 . ADOR IS DDD. EOUIV IN RIGHT END	1544
0762 69 1065 0063 0477 69 1065 0661		N D0009	69 PRE 69 PRE	SUBR9 SUBR7		ANALYZE D-ADORESS STDRE EOUIVALENT OF NEW SYMBOL	2120 2170
1214 45 1068 1329			45	оит		D. NOT BLANK. I. IT IS BLANK.	2386
0670 44 1073 0674			44 IPOS			D. USE I-POSITION. I. USE D-POSITION.	1350
1322 44 1076 1026			44	EVN		D. DYNAMIC LEVEL IS ODD.	1998
0678 44 1081 0682			44 YES			I. D IS NOT TRUE ADDRESS	1974
0632 95 1085 1087 1087 97 1085 0942			95 CP 97 CP			IF BACKWARD L. SUBTRACT TAG-COUNT) IF BACKWARD L. SUBTRACT TAG-CDUNT)	1908 1910
0782 69 1086 0586			69	SU817		PERHAPS MDDIFY OYNAMIC LEVEL)	2148
0934 15 1090 8002			15 K	8002		MAKE STORING OROER. AND STORE ZERD	2510
1036 21 1091 1094 1038 16 1091 0245	1091		21 OLO 16 OLO		OLO	SAVE OYNAMIC LEVEL OF L FROM 0) WHICH L IS LESS, MEASUREO DN CIRCLE)	822 840
0793 20 1097 1020 0651 16 1097 0701	1097	C ST	20 A0 16 A0	SAI	A0	STORE COMPARISON CONSTANT COMPARISON CONSTANT, SUBTRACTEO	1668 1686
0548 93 1101 0785			93	SE0		0, OPERATION 31. I. 30,35,36.	1828
0002 69 1112 0039		R 0002	69	SUB14		DP+ C.I.+ TAGS+ OPTIM+ ALDPT	2248
0912 65 1115 0611			65	SUB11		8LANK 0, BUT NDT MOF. FINO VALUE OF 0	2132
0714 69 1117 1024			69	SUBR8		PRDCESS I	2288
0466 10 1119 0724 0684 15 1119 0734			10 291XX 15 291XX			ADO 29 AOO 29	1478 2482
0410 69 1124 8003 1271 11 1124 0929		0 DF	69 S0000 11 27TH	8003		SUBTRACT 2000, TD OETERMINE RANGE	752 2050
0086 24 1125 0028 0260 69 1125 8003	1125	J SENO J BRNG	24 S0001 69 S0001	X 8003	S0001	STORE SET DF DATA) BRING BACK A SET,)	412 554
0211 24 1199 0252 0174 69 1199 8003	1199	J SEN 0 DL	24 SMAXM 69 SMAXM	8003	SMAXM	STDRE PROCESSED CARD)	882 944
	1200	D MAX	24 SMAX1 84 1200	x	SMAX1	CONSTANT FOR WHETHER STDRAGE IS FULL SEARCH TABLE ACCORDING TO SIZE DF AOOR	518 1564
0604 16 1208 0913			16 909			SUBTRACT 9090908995	1448
0962 69 1215 0063			69	SUBR9		ANALYZE I-ADORESS	2182

0764 6	9 1217	0063	с во	тн	69		SUBR9	ANALYZE I	2316
0609 1	6 1218	8002	R UO	002	16	KA	8002	RESTORE LOWER, AND ADD NEXT SYMBOL	2512
0472 6	9 1226	0677	N 00	004	69		INOEX	ORUM AOORESS. INOEX IF TAGGEO	2136
1117 4	4 1228	1278	J		44	NGI		O+RELOCATEO I IS EXCESSIVE	2290
1026 6	5 1229	1033	N EV	N	65	8003	EO	EVEN. PUT 8003 AT RIGHT ENO OF LOWER	2002
0966 1	6 1230	8002			16		8002	OUPLICATE INTO AVAILABILITY TABLE)	2422
0029 6	9 1232	0740	R	0029	69	ZO	SUB	BLR ENTRY. TO SUBROUTINE	2442
0010 6	9 1234	1244	J	0010	69	85TH		C.I. FOR AVAILABILITY TABLE)	255 2
0682 6	0 1235	1089			60	8	AX	MORE TAGS INTO UPPER	1976
1088 4	4 1241	0743	R TA		44	YES	sw	IS A LOCATION AVAILABLE IN THIS GROUP	1644
0788 6	9 1243	0441			69		SUB13	FINO OYNAMIC LEVEL	2158
0752 1	0 1245	0952			10	os		RESTORE VARIABLE BRINGING ORDER	2596
0644 6	1 1248	0966	N AL	L	61	SENO		OUPLICATE INTO AVAILABILITY TABLE)	2420
1277 6	5 1250	0706	J		65	1250		BRING SHIFT AODENOS	1824
1106 4	5 1260	1211			45		вт	O. I TAG IS NON-ZERO	1948
1012 4	4 1265	0616			44	DNB		0. 0 IS NOT BLANK.	2192
0552 1	5 1266	0784			15	ST		MAKE STORING ORDER	2488
0914 6	9 1267	0063			69		SUBR9	ANALYZE O	2336
0720 6	9 1273	1025			69		SUB2R	RESERVE IF ORUM AGORESS	1406
0473 6	5 1276	0611	R 00	005	65		SUB11	NEW SYMBOL. FINO EQUIVALENT	2140
0974 1	0 1277	8003			10		8003	MAKE BRINGING OROER	1822
1076 6	5 1279	1033			65	8002	EO	000. PUT 8002 AT RIGHT END OF LOWER	2000
0980 4	6 1283	0634			46	DONE		OUPLICATE INTO AVAILABILITY TABLE)	2416
0938 6	9 1293	0441			69		SUB13	FINO OYNAMIC LEVEL	2220
0952 1	6 1295	1249			16	C7	LOOP		2598
0910 8	4 1300	1275			84	1300		LOOK UP IN TABLE	1838
0790 1	6 1308	1216			16	99THX			2478
	1 1308					99THX			1474
1262 6	9 1315	1024			69		SUBR8	PROCESS L	2254
0608 4	4 1316	0001	R UO	001	44		SETCC	I, IT IS ZERO AND WE HAVE FINISHED	2502
1064 4	6 1317	0968			46	0		O, ORUM. I, CORE.	2366
1315 4	4 1321	1324	J		44	NGL		O+ RELOCATEO L IS EXCESSIVE	2256
0666 4	4 1326	1078	J		44	NGO		O+ RELOCATEO O IS EXCESSIVE	2270
	5 1328 5 1328		R 00			83RD 83RO	BP BP		2320 2322
0121 6	5 1328 5 1328	1233	R 00	004	65	83R0 83R0	BP BP	NEW SYMBOL I. CARO IS UNUSABLE	2326 2340
	5 1328		R 00			83R0	ВР		2342
0780 4	6 1329	0094			46	OUT	0094	O. WE HAVE FINISHED	2398
1016 4	5 1330	1332			45		BL	I • I IS UNPUNCHEO	2462
0578 6	9 1331	0677	R IO	007	69		INOEX	CORE ADDRESS. INDEX IF TAGGED	2214
1280 6	9 1333	0740			69	,	SUB	TO SUBROUTINE	2450
0738 6	5 1342	0611			65		SUB11	FINO AN EOUIVALENT	2098
1284 1	5 1344	1249			15	RS1	LOOP	INITIAL WORD SHOWING LOCATION OF TABLE	2558
1294 6	0 1348	1284			60	A1		VARIABLE BRINGING OROER INTO UPPER	2556
1048 4	4 1351	1052			44	ok		I. WE SHOULO INTERCHANGE	1874
1096 1	1 1352	1046			11	0		ARE WE CONE	2592
	6 1354 5 1354					600 600	SAI		1672 1682

0951 16 1354 1309 0915 60 1354 1088	0 599	16 600 60 A0000	TA	WHAT CELL OID WE RESERVE)	1742 1762
0322 20 1355 0000 13 0565 20 1355 0900 13 1354 60 1355 1088	55 P C3	20 A0001 20 A0001	0000 0900	A0001 RESTORE COMPARISON CONSTANT AND MODIFY A0001 INITIAL OF STORING ORDER	986 1128
1230 69 1355 8003 1348 69 1355 0168	0 600 J P A1	60 A0001 69 A0001 69 A0001	TA 8003 T0001	OUPLICATE INTO AVAILABILITY TABLE) INITIAL VARIABLE BRINGING ORDER	1764 2424 2600
0610 20 1356 0000 13 0549 60 1356 1088	56 0 0B P 601	20 A0002 60 A0002	0000 TA	A0002 COMPARISON CONSTANT	984 1766
0599 60 1357 1088	P 602	60 A0003	TA		1768
1248 24 1359 1034 13	59 J SEND	24 A0005	Α	A0005 DUPLICATE INTO AVAILABILITY TABLE)	2426
0116 20 1551 0900 15	51 0 796	20 A0197	0900	A0197 COMPARISON CONSTANT FOR LAST LINE	1132
0382 20 1554 1307 15 1054 60 1554 1088	54 J 0 799	20 A0200 60 A0200	TA	A0200 MAKE ORUM AVAILABLE 1	972 1770
0427 20 1555 0900 15 1000 69 1555 8003 0554 22 1555 0179 15 0394 23 1555 0179 15 0718 69 1555 0659 0765 60 1555 1088 0916 24 1555 0000 15 1352 69 1555 0172	P P1 55 P P2 55 P P3 J 0 800 55 0 0	20 A0201 69 E0001 22 E0001 23 E0001 69 E0001 60 A0201 24 A0201 69 A0201	0900 8003 EXITZ EXITZ TA 0000 T0005	A0201 TO RESTORE FOR NEXT LINE OF TABLE INITIAL OF BRINGING ORDER E0001 INITIAL OF ORDER TO STORE 0-POSITION E0001 INITIAL OF ORDER TO STORE I-POSITION BRING WORD SHOWING EOUIVALENT A0201 COMPARISON CONSTANT FOR END OF JOB	1134 1364 1366 1368 1542 1772 2434
1245 69 1555 0168		69 A0201	T0001	TO RESTORE BEFORE ENO OF JOB	2606
0365 20 1660 0000 16 0592 65 1660 0665 1266 24 1660 0029 16	J	20 G0001 65 G0001 24 G0001	0000 0029	GO001 RESTORE COMPARISON CONSTANT AND MODIFY BRING EQUIVALENT OF REGION GO001 STORE ADDRESS OF 0001 OF REGION	982 1486 2492
0405 20 1661 0000 16	61 0 0A	20 G0002	0000	G0002 COMPARISON CONSTANT	980
0647 24 1669 0072 16 0370 69 1669 0772 0611 69 1669 1072 0617 2 1669 1122 16 0420 69 1669 1224 0616 69 1669 1274	R J0003 N SUB11	24 ORUMT 69 ORUMT 69 ORUMT 24 DRUMT 69 ORUMT		ORUMT PRESET DRUM TAG) BLANK 1. IS ORUM FULL IS THE DRUM FULL ORUMT CHANGE ORUM TAG TO 9) BLANK AOORESS. IS ORUM FULL BLANK 0 ANO 1. CHECK DRUM TAG ORUMT CHANGE ORUM TAG. ORUM CANNOT BE FULL. SAVE IN CASE I IS BLANK BLANB SPECS. SUBR. BRING BACK BLANB + ORCEB BLANB STORE EQUIVALENT OF BLANK AOORESS	966 1302 1608 1702 2080 2194
1298 24 1669 1280 16	69	24 ORUMT		ORUMT CHANGE ORUM TAG. ORUM CANNOT BE FULL.	2448
0341 69 1679 0232 0438 24 1679 0282 16 0268 20 1679 0271 16 1008 65 1679 0376 0626 65 1679 0371		69 BLANB 24 BLANB 20 BLANB 65 BLANB 65 BLANB	M0004 A J0004	SAVE IN CASE I IS BLANK BLANB SPEC. SUBR. BRING BACK BLANB + ORCEB BLANB STORE EOUIVALENT OF BLANK ACORESS BRING EOUIVALENT OF BLANK BACKWARO L BRING EOUIVALENT OF BLANK BACKWARO L	798 870 1180 1238 1306
1283 65 1680 0690 0381 69 1680 0533 0220 65 1680 0177	N 00NE N F0003	65 ZEROX 69 ZEROX 65 ZEROX	RU EXITX	CLEAR ACCUMULATOR BRING ZERO TO INDICATE RESERVATION ORUM AOORESS. OR EQUIVALENT TO ORUM	2428 1032 1158
0392 24 1689 0442 16 0290 10 1689 1002	22 U 98 J Y	24 Z0001 10 Z0001	LOOP	Z0001 STORE SYMBOL) A00 A SYMBOL INTO UPPER, FROM BOTTOM	1336 1508
0340 10 1898 1002 0990 10 1898 0608	n N	10 ZMAXM 10 ZMAXM	L00P U0001	AOO A SYMBOL, STARTING AT TOP AOO A SYMBOL TO UPPER	1516 2500
0134 20 1899 0302 18	99 J	20 ZMAX1		ZMAX1 CLEAR REGION AND SYMBOL TABLES)	954
0744 11 8001 0452 0634 11 8001 8002 070 65 8001 0327 0332 15 8001 0289 0389 10 8001 0295 0461 11 8001 0437 0412 10 8001 0295 0461 11 8001 0437 0412 10 8001 0713 0542 10 8001 0713 0542 10 8001 0713 0547 11 8001 0604 0240 10 8001 0997 0679 65 8001 0314 67 8001 1319 0314 67 8001 1321 1035 15 8001 1341 1270 15 8001 1341 1270 15 8001 1327 0966 16 8001 0999 0732 10 8001 0999 0732 10 8001 0999 1285 60 8001 1292	N RC C NZ N OUT N LH N ORM	65 8001 15 8001 10 8001 11 8001 11 8001 10 8001	8002 RES LR	BRING BACK A SET) BRING BACK A SET OF RESULTS) MAKE SEVERAL VARIABLE OROERS) RESTORE TO POSITIVE CORE AOORESS. RESTORE THE 2000 RESTORE THE 9060 WRONG SYMBOL. RESTORE UPPER TO PLUS CLEAR FIRST LETTER ARE LAST FOUR CHARACTERS OIGITS) THEY ARE OIGITS. GET VALUE) EOUIVALENT IS IN I POSITION OF LOWER EOUIVALENT IN O POSITION OF LOWER AVAILABILITY WORD BACK INTO UPPER WHAT CELL 010 WE RESERVE) L-0 AOOENOS TO LEFT ENO LOWER) CLEAR OP FROM ACCUMULATOR ORUM. MAKE POSITIVE AGAIN PUT 1T INTO UPPER	2412 2418 640 918 1060 1066 1072 1380 1394 1402 1428 1446 1460 1546 1548 1724 1752 1794 1936 2058
0694 60 8001 0709		60 8001 65 8002	SUB10	PUNCH A CARO, AND REPEAT RBO REPLACE DIGIT OF AVAIL. WORD BY W)	2408
0465 65 8002 0723 0683 66 8002 0491 0969 60 8002 0777 0613 65 8002 0177	J N FXT	65 8002 66 8002 60 8002 65 8002	EXITX	REPLACE DIGIT OF AVAILS WORD BY W) CHANGE SIGN OF CORRECTION NUMERIC ADORESS ALONE IN UPPER FIXEO ADORESS. CLEAR UPPER AND EXIT.	1258 1382 1410

1323	65	8002	0731				65	8002			CLEAR UPPER		1430
D77D	16	8D02	D729				16	80D2			AOORESS INTO LEFT ENO DISTRIBUTOR		1562
D501	15	8002	09D9				15	8D02			4 TIMES DYNAMIC ADDRESS IN O POSITION		1626
D909	15	8002	0693				15	8DD2	SSW		4 TIMES OYNAMIC ADDRESS IN O POSITION		1628
1021	16	8002	1079				16	8002			WHAT CELL OIO WE RESERVE)		1748
1055	16	8002	1313				16	8D02			(-O AODENOS TO LEFT END LOWER)		179D
0799	16	8002	D910				16	80D2			0-ADORESS TO LEFT END OF DISTR)		1836
		8002					65	8D02	вотн		ODO. SEPARATE LAST AODEND.		1896
1056	65	8D02	0965				65	8002			OELETE O TAG		1942
D662	15	8002	1221				15	8002			OOUBLE IT		2046
1062	9D	8002	1067				90	8DD2			O, WE ARE NOT ON FIRST BACKWARD CARO		2238
0022	65	8003	0229				65	8003	LOOP		BRING BACK A SET)		55D
1080							65	8D03	200.		WHICH L IS LESS, MEASURED ON CIRCLE)		838
0212							16	8003			MOOIFY TO END WITH 1999)		1052
0543							10	8003			MAKE SEVERAL VARIABLE OROERS)		1076
D567					С	L00	ii	8D03			ARE LAST FOUR CHARACTERS DIGITS)		1452
1319						LR	69	8003			CLEAR DISTRIBUTOR		1552
0689					_		60	80D3	SB10A		CLEAR LOWER		1586
0736							65	80D3	SSW		CLEAR ACCUMULATOR AND JUMP		1616
0667							11	8D03			PUT INTO DISTRIBUTOR		1720
0717							60	8003			CLEAR LOWER		1730
1074							15	8003			WHAT CELL OIO WE RESERVE)		1758
0936							6D	8003			SHOULD WE INTERCHANGE ADDENOS)		1862
1272							65	8003	EXITZ		NEW DYNAMIC LEVEL INTO LOWER		1916
121D							69	8003			CLEAR OISTRIBUTOR		1932
0648							69	80D3			CLEAR OISTRIBUTOR		1968
0546					N	NZ	67	8003	EXITY		IF NOT 8001, CORRECTION IS ZERO		2020
0933							11	80D3			CORE. CLEAR UPPER	•	2054
		8003					61	8003			CHANGE ITS SIGN		2396
D955	21	9972	0755	9972	J	STR	21	9972	SKP	9972	NEW AVAILABILITY WORD INTO ORUM)		1738
0360						BRNG	69	9999	8003		BRING BACK A SET)		644
0D74	69	9999	8003		J	BRNG	69	9999	8003		BRING BACK A SET OF RESULTS)		924

INSTRUCTIONS LISTED IN ORDER OF LOCATION ADDRESS

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SEQUEL TO MANY PSEUDO-OPS.
0001 60 0003 0709
                                   N SETCC
                                                                   SUB10
                                                 60 READC
                                                                                                                                                             1580
0002
                                                                                         OP, C.I., TAGS, OPTIM, ALOPT REAO ONE CARO
      69
                                   R
                                         0002
                                                 69
70 R0011
                                                                   SUB14
          1112 0039
                                                                                                                                                             2248
0003
      70 0161 1041
                                     REACC
                                                                                                                                                              364
                                                                                         TAG FOR SEARCH STARTED BY MOF
0004
                                                                                                                                                              520
      90 0088 0000
                                   K P
                                                  90
                                                          0088
                                                                       0000
                                                                                                                                                              440
0005
      69 0208 0061
                                                                   SUBR3
                                                                                         15 1
                                                                                              FIXEO AOORESS )
                                                  69
      24 0178
                                                                                 EXITY STORE EXIT
0006
                 0231
                         0178
                                   N SUBRI
                                                  24 EXITY
                                                                                                                                                              950
                                                                                         IF SO, START FORWARD SEARCH
OELETE QUITT TAG )
IS THIS LAST SET )
C.I. FOR AVAILABILITY TABLE )
      44 0011 0012
69 1044 0047
                                                 44 MOFLI
69 81STX
                                                                                                                                                              388
372
0007
                                                                   ARCOE
0008
                                         0008
0009
      65 0553 0907
                                                  65 VAR
0010
      69
          1234
                 1244
                                  J 0010
N MOFLI
                                                 69 85TH
69 I
                                                                                                                                                             2552
0011
      69 0014
                                                                                         STARTEO SEARACH WITH INDEXED O
                 0107
                                                                                                                                                              400
      69 0015 0018
0012
                                   C ABCOE
                                                                                         PROCESS I
                                                                                                                                                              390
0013
      22 0167 0070
                         0167
                                                  22 XXXX1
                                                                                 XXXX1 BRING BACK A SET )
                                                                                                                                                              638
                                                                                         TAG FOR SEARCH STARTED BY INDEXED OF PREPARE TO PUNCH CARD
                                                                       0000
                                   ΚI
0014
      90 0089 0000
                                                  90
                                                         0089
                                                                                                                                                              522
      60 0003 0057
                                                  60 REACC
                                                                   SB10A
                                                                                                                                                              392
      65 0114 0984
                                   Ř
                                         0016
                                                  65 91STX
                                                                                  TAG IN CASE L IS UNDEFINED SYMBOL )
1050 CHANGE FIRST-CARD INDICATOR TO 2ND )
0016
                                                                                                                                                             2522
0017
      24 1050 0253
                         1050
                                                  24
                                                         1050
                                                                                                                                                              490
0018
      24 0177 0680
                         0177
                                   N SUB21
                                                  24 EXITX
                                                                                        STORE EXIT
                                                                                                                                                             2178
                                                                                         WAS THERE JUST ONE SEARCH CARO
SAVE L FROM CARO THAT STARTEO SRCH )
BLA ENTRY. CHANGE ORUM TAG
0019
                0503
      69 1050
                                   N BACKW
                                                  69
                                                          1050
                                                                                                                                                              604
                                                  69 P0006
0020 69 0182 0085
                                                                                                                                                              622
0021 69 1044
                                         0021
                                                     81STX
                                                                                                                                                             2446
                                                                                         BRING BACK A SET )
O, IT IS NOT, AND WE OUIT
STORE PROCESSEO CARO )
      65 8003 0229
0022
                                                         8003
                                                                                                                                                              550
                                                     OUITT
0023
      45 0026 0077
                                                  45
                                                                                                                                                              436
                                                                    8002
      69 0186
                                                     P0010
0024
                 8002
                                                  69
                                                                                                                                                              880
      60 0153 0764
                                                     R0003
                                                                                         SYN ENTRY. ALPHABETIC I
0025
                                         0025
                                                  60
                                                                   BOTH
                                                                                                                                                             2314
                                                                                         SYN ENIRY - ALPHABETIC I
WAS THERE ONLY ONE SEARCHEO CARO
TO INITIALIZING SUBROUTINE
STORE SET OF OATA )
BLR ENTRY - TO SUBROUTINE
TO SUBROUTINE 9 TO ANALYZE THE AOORESS
COMPARISON CONSTANT FOR STORING
0026
                                  N QUITT
      69 1050 0303
69 0001 0006
                                                  69
                                                         1050
                                                                                                                                                              532
                                                     SETCC
0027
                                                                   SUBR1
                                        0027
                                                 69
                                                                                                                                                             2638
          0031
                                                                                                                                                              414
0028
                 0035
                                                                   SUB
                                  R
                                         0020
                                                     ZO
0029
      69
          1232 0740
                                                  69
0030
      69 0633 0063
                                                                   SUBR9
                                                                                                                                                             1150
                                                  69
                                                                   8002
0031
      69 0155
                 8002
                                   0 0
                                                  69 R0005
                                                                                                                                                              514
                                                                                         OP, C.1., OPTIM, ALOPT, ETC.
MULTIPLE BRANCH ACCOROING TO TAGS )
0032
      65 0103 0407
69 0036 0039
                                  N BCOEF
                                                  65 FINAL
                                                                                                                                                              478
376
                                                                   SUB14
                                                  69
      99 0338
                                                                   9X8
                 0239
                                   N XX8
0035
      15 0038 0043
                                                  15 16THX
                                                                                         STORE SET OF OATA )
      69 0089 0042
0036
                                                  69
                                                                   SUB19
                                                                                 PROCESS L
ROOO1 IF SO, PUT IN DUMMY MOVEABLE WORDS 1
                                                                                                                                                              378
0037
          0151 0104
                                                  24 R0001
                         0151
                                                                                                                                                              504
0038
      00 0001
24 0177
                                                  00 0001
24 EXITX
                0000
                                    16THX
                                                                       0000
                                                                                 EXITX STORE EXIT
STORE SET OF OATA )
                         0177
0039
                0430
                                   N SUB14
                                                                                                                                                             1924
      10 0044
                                     LOOP
0041
                 8003
                                                                       8003
                                                                                                                                                              408
                                                  10
0042
      24 0177 0480
                                   N SUB19
                                                  24 EXITX
                                                                                 EXITX STORE EXIT
                                                                                         STORE SET OF OATA )
STORE SET OF OATA )
0043
      44 0147 0148
                                                  44
                                                                                                                                                             418
410
0044
      69 0151
                                                  69 R0001
                                                                       8002
                 8002
0045
      24 0177
                 0630
                                   N SUB20
                                                                                 EXITX STORE EXIT
                         0177
                                                      FXITX
0046
                                                                                  IF SO, IS IT FIXEO )
1030 OELETE QUITT TAG )
      60 0152
                 0257
                                                  60
                                                     R0002
                                                                                                                                                              452
374
                         1030
                                                         1030
0047
      24 1030 0033
                                                  24
                                                  94 MOFLP
                                                                                         O, YES
PRESET EXIT FROM BACKWARDS ROUTINE )
0048
      94 0051 0053
                                                                                                                                                              384
                                                                                 OONE
0049
          0052
                0205
                         0052
                                                  24 DONE
                                                                                         TO RESTORE COMPARISON CONST + AOVANCE STARTED SEARCH WITH MOF OPERATION
      69 0156 8002
69 0004 0107
0050
                                   0.00
                                                  69 R0006
                                                                       8002
0051
                                   N MOFLP
                                                  69 P
                                                                                                                                                              398
0053
      60 0902
                 0007
                                                          0902
                                                                                         IS O INCEXEO
                                                                                                                                                              386
                                                  60
                                                                                IS O INGEXED

EOU ENTRY: ALPHABETIC I

IS O INOEXEO

IS THIS FIRST SET OF SEARCH )

AOVANCE CARO NUMBER )

IS CARO OF TYPE 08 )

ALOPT STORE MODIFIED ALOPT
0054
      60 0153 0764
                                         0054
                                                  60 R0003
                                                                   BOTH
                                                                                                                                                             2312
0055
      60 0902
                 0307
                                                  60
                                                      0902
1050
                                                                                                                                                              464
0056
      69
          1050
                                                                                                                                                              424
                 0203
                                                  69
0057
      15 0181 0635
                                   C SB10A
                                                  15 P0005
0058
      65 0160 0065
                                   N NO
                                                  65 R0010
                                                                                                                                                              432
      20 0197
0059
                 0500
                         0197
                                                                                                                                                              810
                                                  20 ALOPT
0060
      44 0026 0064
                                                  44 QUITT
                                                                                         IF N G. QUIT SEARCH
                                   N SUBR3
                                                                                 EXITX STORE EXIT
EXITZ STORE EXIT
      24 0177 0030
24 0179 0482
0061
                                                  24 EXITX
                                                                                                                                                             1148
                                   N SUBR9
0063
                                                  24 EXITZ
                                                                                                                                                             1434
                         0179
                                                                                  IF FIXEO, START BACKWARD PROCESSING
IS CARO OF TYPE 08 )
MOOIFY ALOPT AGAIN )
1050 START ON L. FIRST-CARO TAG )
      45 0144 0019
                                                  45
                                                                   BACKW
0065
      16 0068 0023
                                                  16 810TH
                                                                                                                                                              434
      65 0197 0351
0066
                                                  65 ALOPT
                                                                                                                                                              854
          1050
                 0358
                         1050
                                                         1050
                                                                                                                                                              616
0068
      00 0000
                                   K 810TH
                                                          0000
                                                                      0008
                0008
                                                  00
0070 65 8001 0327
                                                  65
                                                          8001
                                                                                         BRING BACK A SET
                                                                                                                                                              640
                                                  44 QUITT
0071
          0026
                                                                                         IF SO. OUIT SEARCH )
                 0076
0072
                                                                                                                                                              968
      65
          0175 0429
                                                  65 AVAL
                                                                                         MAKE DRUM AVAILABLE
                                                                                         PUNCH USUAL OUMMY OUTPUT CARO
BRING BACK A SET OF RESULTS )
0073
      60 0010 0709
                                   R
                                         0073
                                                  60
                                                          0010
                                                                   SUB10
                                                                                                                                                             2550
                                   J BRNG
0074
      69
          9999
                                                                       8003
                                                                                                                                                              924
                 8003
                                                          9999
                                                  69
      00 1000
                                   K 13R0
0075
                 0000
                                                                                         IF SO, OUIT SEARCH )
ALPHARETIC L
                                                  45 C
0076
      45
          0088 0026
                                                                   QUITT
                                                                                                                                                              446
0077
          0151 0005
                                                  60 R0001
                                                                                                                                                              438
      60
          0032
                 0019
                                                     BCOEF
                                                                   BACKW
                                                                                         IF I IS FIXEO, START BACKWARO
0079 00 0000 0007
                                   K 710
                                                  00
                                                         0000
                                                                       0007
                                                                                                                                                              526
                                                  60 R0001
                                                                                         ALPHARETICAL L INTO UPPER
0080
          0151
                0455
      60
      91 0034
                                                  91
                                                                                         MULTIPLE BRANCH ACCORDING TO TAGS )
                                   J SEND
                                                                                 ROOO1 BRING BACK A SET )
STORE SET OF OATA )
                         0151
                                                     R0001
0082
      24 0151 0204
                                                  24
                                                                                                                                                              556
0083
      65 0086
                 0041
                                                                   LOOP
                                                                                                                                                              406
                                                  65
                                                     SENO
      65 0990
                                   R
                                         0084
                                                                      8002
                                                                                         AOOING OROER TO LOWER
0084
                                                                                                                                                             2498
                                                                                        SAVE L FROM CARO THAT STARTED SRCH )
STORE SET OF OATA )
SAVE O FROM CARO THAT STARTED SRCH )
GET OP, C.I... TAGS, OPTIM, ALOPT.
PROCESS O
0085
      24 0238 0191
                         0238
                                                  24 SAVEL
                                                                                 SAVEL
                                                                                                                                                              624
      24 1125
                 0028
                                   J SEND
                                                  24
                                                                                 50001
                                                                                                                                                              412
0086
                         1125
                                                      50001
      24
                 0193
                                                     SAVEO
                                                                                 SAVE0
                                                  69
0088 69 0091 0039
                                                                   SUB14
                                                                                                                                                              448
                                                                                                                                                              380
0089
      69 0092
                 0045
                                                  69
                                                                   SUB 20
                                                                                         WITH L. ALTER EXIT )
IS O ACTUALLY AN AOORESS
IS IT AN MOF OPERATION )
                                                      OONE
                                                                                 OONE
0091 95 0144 0046
                                                  95
                                                                                                                                                              450
                                                  69 OPTIM
0092 69 0095 0048
                                                                                                                                                              382
0093 65 0152
                                                                                         ALPHARETIC O
                 1345
                                                 65 R0002
                                                                                         BEGINNING OF REGION TO BE RESERVED ALL CASES. STORE PROCESSED CARO )
0094 60 0158
                1114
                                   R
                                         0094
                                                  60 R0008
                                                                                                                                                            2380
                                   J DN1
0096 65 0117 0321
                                                  65 VAR2X
```

```
65 R0002
65 R0009
69 SUB
69 READC SUBR1
65 LNM SUB22
65 OONE SUB22
66 OONE SUB22
67 R0002
68 R0002
69 ROOO2
69 ROOO2
60 SAVE ORCEO
60 SAVE ORCEO
60 SAVE ORCEO
61 STHIS LAST SET
62 LORGE
63 ORCE
64 R0003
65 ORREG
65 ORREG
66 SAVE ORCE
67 LIS THIS LAST SET
68 SAVE ORCEO
69 PISTX
69 PISTX
61 OSA
63 CHANGE FIRST-CARO INDICATOR TO 2NO )
69 CLEAR REGION AND SYMBOL TABLES )
69 TI
60 OOO
60 OOO
61 SPEC. SUBR.
61 FIRST-CARO INDICATOR TO 2NO )
62 CLEAR REGION AND SYMBOL TABLES )
63 SPEC. SUBR.
64 BRING BACK BLANB + ORCEB
65 OOOO
65 OUITT
66 A0197 OOOO
66 OUITT
66 A0197 OOOO
67 OOOO
68 OUITS EARCH
                                                                                              0097 65 R0002
0098 65 R0009
0099 69
 0097 65 0152 1116
0098 65 0159 0964
0099 69 0502 0740
0100 69 0003 0006
0101 65 0397 0201
0102 65 0052 0201
0104 24 0152 0105
                                                                                                                                                                                                                                                                                                                                                                       2454
                                                                                                                                                                                                                                                                                                                                                                          362
                                                                               J LN
                                                                                                                                                                                                                                                                                                                                                                           786
                                                        0152
 0104 24 0152 0105 0152
0105 24 0153 0236 0153
0106 16 0069 0623
0107 24 1030 0083 1030
0109 65 0062 0217
0110 35 0005 0173
0111 69 0114 0017
                                                                                                                                                   SPEC. SUBR. BRING BACK BLANB + ORCEB

O000

GUITT

O900

A0197

IFSO. GUIT SEARCH

INVALIO AOORESS

BP

BLANK I. CARD IS UNUSABLE

X E DRUM. PUT I-EOUIVALENT INTO E

NEW SYMBOL I. CARO IS UNUSABLE

X E BOOX ADDRESS

X E CORE ADDRESS

X E CORE ADDRESS

X E OTHER ADDRESS

DP

N G O. CARD IS UNUSABLE

BP

BLANK D. CARD IS UNUSABLE

BP

BLANK D. CARD IS UNUSABLE

BP

BLANK O. CARD IS UNUSABLE

BP

BLANK O. CARD IS UNUSABLE

BP

BLANK O. CARD IS UNUSABLE

BP

BLANK D. CARD IS UNUSABLE

BOULIV OLD SYMBOL. STORE I AS ITS EQUIVALENT

SD

EQUIV NEW SYMBOL. STORE I AS ITS EQUIVALENT

SD

EQUIV OORE. STORE IT AS THE EQUIVALENT.

BOULIV OTHER. STORE I AS THE EQUIVALENT.

BOULIV OTHER. STORE I AS THE EQUIVALENT.

BUILD OF THE COULVALENT.

WITH I OR L. RESPECTIVELY

ZMAXI CLEAR REGION AND SYMBOL
 0112 11 0365 8003
0113 69 0235 0438
0114 90 0000 0000
                                                                                 N SSB
                                                                                                                                                                                                                                                                                                                                                                          868
                                                                                 K 91STX
 0115 45 0318 0026
0116 20 1551 0900
0118 65 1328 1233
                                                                                                                 45
20 A0197
65 83RD
65 83RD
20 E
65 83RD
20 E
20 E
20 E
                                                                                 Q 796
                                                        1551
                                                                                                                                                                                                                                                                                                                                                                       1132
                                                                                 R 00001
 0118 65 1328 1233
0119 65 1328 1233
0120 20 0095 1098
0121 65 1328 1233
0122 20 0095 1098
0123 20 0095 1098
                                                                                 R Q0002
N 00003
                                                                                                                                                                                                                                                                                                                                                                       2322
                                                        0095
                                                                                                                                                                                                                                                                                                                                                                       2324
                                                                                 R 00004
                                                           0095
                                                                                 R 00005
                                                                                                                                                                                                                                                                                                                                                                       2328
                                                                                 R Q0006
                                                            0095
 0124 20 0095 1098
0125 65 1328 1233
                                                                                                                   20 E
65 83RD
65 83RD
                                                            0095
                                                                                 R 00007
                                                                                 R 00008
                                                                                                                                                                                                                                                                                                                                                                       2340
 0126 65 1328 1233
                                                                                 R 00009
                                                                                                                                                                                                                                                                                                                                                                       2342
 0127 20 0536 1289
                                                            0536
                                                                                 N Q0010
                                                                                                                   20 EQUIV
 0128 20 0536 1289
0129 20 0536 1289
0130 20 0536 1289
                                                                                                                   20 EQUIV
20 EQUIV
                                                                                                                                                                                                                                                                                                                                                                       2346
                                                            0536
                                                                                 R 00011
                                                            0536
                                                                                 R 00012
                                                                                                                                                                                                                                                                                                                                                                       2348
                                                            0536
                                                                                 R Q0013
                                                                                                                   20 EOUIV
 0130 20 0536 1289
0131 20 0536 1289
0132 01 0000 0000
0133 96 0136 0088
0134 20 1899 0302
0135 69 0040 0343
                                                                                                                  20 EQUIV
01 0000
96 B
                                                            0536
                                                                                 R 00014
                                                                                                                                                                                                                                                                                                                                                                       2352
                                                                                 K 12NDX
                                                                                                                                                                                        WITH I OR L, RESPECTIVELY

ZMAX1 CLEAR REGION AND SYMBOL TABLES )

BRING BACK L AND D )

IS I A FIXEO ADORESS )

MAKE NEW BRINGING ORDER )

PROCESS!
                                                                                                                                                                                                                                                                                                                                                                       2672
                                                                                                                   20 ZMAX1
                                                        1899
                                                                                                                                                                                                                                                                                                                                                                          954
                                                                                                                   69 SAVED
                                                                                СВ
 0136 60 0153 0357
0137 65 0117 0571
0138 69 0141 0042
                                                                                                                   60 R0003
                                                                                                                                                                                      IS I A FIXEO ADORESS )
MAKE NEW BRINGING ORDER )
PROCESS L
CHANGE TAG TO SECOND-CARD TAG )
MULTIPLE BRANCH ACCORDING TO TAGS )
PROCESS D, AND TO 08 ROUTINE
EXITX STORE EXIT
BRING BACK A SET )
IS IT AN MDF OPERATION
PROCESS D BACKWARDS
ROODS BRING BACK A SET )
STORE SET OF DATA )
FINAL STORE VARIABLE ORDER
PROCESS I FORWARDS
IF SO, OUIT SEARCH
BRING BACK A SET )
REDUCE NUMBER YET TO BE DONE )
PROCESS BACKWARDS D ONCE MORE
VARZX PRESET TO STORE AFTER PROCESSING )
IS IT TYPE 08 )
UPPER, LAST ADDRESS - 2000
POOD2 STORE AVAILABILITY WORD
POOD6 STORE AVAILABILITY WORD
POOD6 STORE AVAILABILITY WORD
POOD8 STORE AVAILABILITY WORD
POOD8 STORE AVAILABILITY WORD
POUNCH A CARO OF THE TABLE
IF I IS N G, QUIT SEARCH
                                                                                 J ENDED
                                                                                                                   65 VAR2X
69
                                                                                                                                                                                                                                                                                                                                                                          904
                                                                                                                                                         SUB19
                                                                                                                                                                                                                                                                                                                                                                          540
 0138 69 0141 0042
0139 69 1044 0297
0140 98 0291 0145
0141 69 0012 0045
0142 24 0177 0330
0143 44 0247 0198
0144 69 0197 0150
                                                                                                                   69 81STX
                                                                                                                                                                                                                                                                                                                                                                           588
                                                                                                                                                           899
                                                                                                                   98 MISC
69 ABCOE
                                                                                                                                                          SUB20
                                                                                                                                                                                                                                                                                                                                                                          542
                                                                                                                                                          OUT
                                                                              N SUBR6
                                                        0177
                                                                                                                   24 EXITX
                                                                                                                   69 ALOPT
                                                                                                                                                                                                                                                                                                                                                                          460
 0144 69 0197 0150
0145 69 0298 0400
0146 24 0155 0408
0147 10 0050 8003
0148 20 0103 0056
                                                                                                                   69
24 R0005
10 QS
20 FINAL
                                                                                                                                                           SUBR5
                                                                                 N 899
                                                                                                                                                      X
8003
                                                        0155
                                                                                                                                                                                                                                                                                                                                                                          420
                                                        0103
                                                                                 N OUT
                                                                                                                                                                                                                                                                                                                                                                           422
                                                                                                                                                          SUB21
 0149 69 0102 0018
0150 94 0026 0055
                                                                                                                   69 LN
94 QUITT
                                                                                                                                                                                                                                                                                                                                                                          784
                                                                                                                                                                                                                                                                                                                                                                          462
                                                                                                                  94 QUIT
15 16THX
16 110TH
69 SUBR5
24 VAR2X
 0161 15 0038 0143
                                                                                                                                                                                                                                                                                                                                                                           560
0161 15 0038 0143 0162 16 0515 0619 0163 69 0066 0400 0164 24 0117 0020 0165 16 0068 0323 0166 10 1003 0558 0168 24 0178 0945 0169 24 0180 0995 0170 2** 0184 1095 0172 71 0177 1096 0173 44 0026 0008
                                                                                                                                                                                                                                                                                                                                                                      1014
                                                                                                                                                                                                                                                                                                                                                                          852
620
                                                          0117
                                                                                                                   16 810TH
                                                                                                                                                                                                                                                                                                                                                                          496
                                                                                                                  10 N
24 P0002
24 P0004
24 P0006
24 P0008
                                                                                                                   10 N
                                                                                                                                                                                                                                                                                                                                                                       1048
                                                                                R T0001
R T0002
R T0003
                                                            0178
                                                          0170
0180
0182
                                                                                                                                                                                                                                                                                                                                                                        2578
                                                                                                                                                                                                                                                                                                                                                                       2582
                                                                                R T0004
R T0005
                                                                                                                                                                                                                                                                                                                                                                        2586
                                                                                                                   71 P0001
                                                                                                                                                                                                                                                                                                                                                                       2590
                                                                                                                   44 OUITT
                                                                                                                                                                                                                                                                                                                                                                          474
 0173 44 0026 0078
0174 69 1199 8003
0175 11 1111 1111
0176 15 0079 0233
0187 20 0197 0081
0188 69 0114 0067
0189 69 0238 0241
                                                                                                                   69 SMAXM
                                                                                                                                                                  8003
                                                                                                                                   1111
                                                                                                                                                        AVAILABILITY WORD
IS TYPE 01

F ALOPT STORE MODIFIED ALOPT
START ON L. FIRST-CARD TAG )
BRING BACK L AND D )
TAGS AND EXIT FOR SUBROUTINE 13
SAVE D FROM CARD THAT STARTED SRCH )
PROCESS L BACKWARDS
PRESET EXIT FROM BACKWARDS ROUTINE )
SUBR5
PROCESS D BACKWARDS
SUB20
PROCESS D FORWARDS
PROCESS D FORWARDS
PROCESS L BACKWAROS
                                                                                 K AVAL
                                                                                                                  11 15 710
                                                                                                                                                                                                            AVAILABILITY WORD
                                                                                                                                                                1111
                                                                                                                  15 710
20 ALOPT
69 91STX
69 SAVEL
00 0908
                                                                                                                                                                                                                                                                                                                                                                           500
                                                      0197
                                                                                N X2
                                                                                 N B
                                                                                                                                                                                                                                                                                                                                                                          674
 0190 00 0908 0344
                                                                                                                  69 P0008
69 DN1
69 LNM
69 LN
 0191 69 0184 0087
0192 69 0195 0305
                                                                                                                                                                                                                                                                                                                                                                           792
 0193 69 0096 0049 0194 69 0397 0400
                                                                                                                                                                                                                                                                                                                                                                           760
 0195 69 0102 0045
0196 69 0149 0305
                                                                                                                                                      BOT VAR X ROOM
                                                                                                                                                                                                                                                                                                                                                                          794
                                                                                                                                                                                                            PROCESS L BACKWARDS
                                                                                                                  20 VAR
16 251XX
                                                                                                                                                                                      VAR STORE VARIABLE ORDER
WHICH L IS LESS. MEASURED ON CIRCLE )
ROOOG TO RESTORE AND AOVANCE
FIRST-CARD TAG
 0198 20 0353 0106
0199 16 0202 1107
                                                       0353
                                                                                 N OUT
                                                                                                                                                                                                                                                                                                                                                                          844
 0200 24 0156 0204
0201 69 1050 1062
0202 00 0000 0025
0203 90 0207 0058
                                                        0156
                                                                                                                   24 R0006
                                                                                                                             1050
                                                                                 N SUB22
K 25IXX
                                                                                                                   69
                                                                                                                                                                                                                                                                                                                                                                      2236
                                                                                                                                                          0025
NO
                                                                                                                   00
                                                                                                                                    0000
                                                                                                                                                                                                                                                                                                                                                                       2652
                                                                                                                                                                                                             IS THIS FIRST SET OF SEARCH )
                                                                                                                   90
                                                                                                                  11 Q
65 FINAL
 0204 11 0607 0161
0205 65 0103 0757
                                                                                                                                                                                                            BRING BACK A SET )
BRING BACK A SET )
                                                                                                                                                                                                                                                                                                                                                                          558
                                                                                                                                                       BRING BACK A SET )
LOOP BRING VARIABLE ORDER, AND REPEAT
IF SO, WHERE DID SEARCH START
IS L FIXED ADDRESS )
LNM ALOPT STORE NEW ALOPT; AND JUMP BACK
X SMAXI CONSTANT FOR WHETHER STORAGE IS FULL
SMAXM STORE PROCESSED CARD )
MODIFY TO END WITH 1999 )
                                                                                                                   65 VAR
69 1030
 0206 65 0353 0229
0207 69 1030 0133
                                                                                                                                                                                                                                                                                                                                                                         428
 0207 69 1030 0133
0208 35 0005 0071
0209 20 0197 0397
0210 28 1200 0028
0211 24 1199 0252
0212 16 8003 0669
                                                                               J
Q MAX
J SEN
                                                                                                                   35
                                                                                                                                    0005
                                                                                                                                                                                                                                                                                                                                                                          442
                                                                                                                  20 ALOPT
24 SMAX1
24 SMAXM
                                                            0197
                                                            1200
                                                                                                                                                                                                                                                                                                                                                                          518
                                                            1199
                                                                                                                                    8003
                                                                                                                                                                                                                                                                                                                                                                      1052
```

0213 20 0181 0234	0181	N OUT	20 P0005		P0005	CLEAR CARD NUMBER	962
0214 69 0317 0142 0215 22 0069 0022	0069	J	69 22 OC	SU8R6	oc	PROCESS I BACKWAROS AGAIN NOT 1st caro. MAKE COMP. CONST.)	864 548
0216 15 0769 0973 0217 14 0320 1036			15 C5 14 50IXX			MODIFY TO TAKE NEXT COLUMN OF TABLE) SAVE OYNAMIC LEVEL OF L FROM D)	1100 820
0218 60 0068 0177		R F0001	60 810TH	EXITX		ADDRESS IS N G BLANK AOORESS	1154
0219 65 0068 0177 0220 65 1680 0177		R F0002 N F0003	65 810TH 65 ZEROX	EXITX EXITX		ORUM ADORESS, OR EQUIVALENT TO ORUM	1156 1158
0221 65 0068 0177 0222 35 0005 0177		R F0004 R F0005	65 810TH 35 0005	EXITX		SYMBOLIC AOORESS, WITH UNDEFINED SYMB 800X ADORESS	1160 1162
0223 65 0068 0177 0224 60 0068 0177		R F0006 R F0007	65 810TH	EXITX		CORE ADDRESS	1164
0225 65 0359 0413		N TP	60 810TH 65 SPR	EXITX		OTHER ADDRESS. USUALLY PART OF CONST. 8OTTOM LINE OF TABLE	1166 1094
0226 69 0279 0039 0227 65 0103 0041		C LP	69 65 FINAL	SUB14 LOOP		GET OP, C.I., TAGS, OPTIM, ALOPT. ALL CASES, BACK TO START OF LOOP	572 512
0229 10 0082 8002 0230 60 0152 0958		C LOOP	10 SENO 60 R0002	8002		BRING BACK A SET) ALPHA8ETIC D INTO UPPER	552 1224
0231 61 0134 8003			61	8003		CLEAR REGION AND SYMBOL TABLES)	952
0233 45 0236 0037	0235		24 T1 45 YYY		Т1	SAVE IN CASE I IS BLANK O, NO. I, YES.	800 50 2
0234 69 1044 0647 0236 24 0155 0227	0155	c YYY	69 81STX 24 R0005	LP	R0005	PRESET ORUM TAG) EITHER CASE: SOMETHING INTO ROOO5	964 510
0237 20 0197 0550	0197		20 ALOPT			MODIFY TO USE ROUTINE FOR UNFIXED D)	828
0239 69 0192 0142 0240 10 8001 0997		N 9X8	69 10 8001	SUBR6		PROCESS I BACKWARDS ARE LAST FOUR CHARACTERS OIGITS)	790 1460
0241 24 0182 0135 0242 24 0182 0285	0182 0182	J SEND	24 P0006 24 P0006	x		BRING BACK L AND O) BRING BACK A SET OF RESULTS)	676 926
0243 10 0146 8002 0244 24 0447 0450	0447	N LOOP	10 24 T2	8002	Ť2	BRING BACK A SET) SAVE IN CASE I IS CORE)	646 804
0245 46 0348 0199	0447	J	46 AE8		12	WHICH L IS LESS, MEASUREO ON CIRCLE)	842
0246 35 0000 0750 0247 10 0200 8002		P C1	35 0000 10 0s	XX 8002		TO PRESET LEFT SHIFT ORDER BRING BACK A SET)	1124 564
0248 20 0553 0256 0249 22 0901 0354	0553 0901	N OUT	20 VAR 22 0901		VAR	STORE VARIABLE ORDER MAKE SEVERAL VARIABLE ORDERS)	658 1086
0250 2 0150 0408	0150	0 OS	24 R0000	х		RESTORE COMPARISON CONSTANT AND MODIFY	750
0251 16 0254 0059 0252 11 0355 0259			16 11STX 11 02			CHANGE ITS FIRST DIGIT TO 8 STORE PROCESSED CARD)	808 884
0253 70 0151 1007 0254 10 0000 0000		K 11STX	70 R0001 10 0000	0000		READ ANOTHER CARD	492 2674
0255 60 0153 0957		K IISIX	60 R0003			BRING ALPHABETIC I	690
0256 69 0009 0039 0257 69 0060 0061			69 69	SUBR3		GET OP C C · I · O TAGS · OPTIM · ALOPT · IF SO , IS IT FIXED)	660 454
0258 65 0103 0557 0259 16 0038 0443		N SKP	65 FINAL 16 16THX			NOT 1ST CARD. MAKE COMP. CONST.) STORE PROCESSED CARD)	544 886
0260 69 1125 8003		J BRNG	69 S0001	8003		BRING BACK A SET)	554
0261 24 0151 0408 0262 10 0565 0331	0151	0 0	24 R0001 10 C3	X SU	K0001	COMPARISON CONSTANT FOR END OF SET MAKE SEVERAL VARIABLE ORDERS)	748 1092
0263 11 0116 0671 0264 45 0000 0001		P C4	11 796 45 0000	0001		ARE WE TO LAST LINE OF TABLE) DIFFERENCE OF BRINGING AND STORING ORD	1020 1130
0265 16 0038 0293			16 16THX			8RING BACK A SET)	652
0266 00 0196 0000 0267 14 0320 1080		P C6	00 0196 14 50IXX	0000		TO MODIFY BRINGING ORDER FOR NEXT COL WHICH L IS LESS. MEASURED ON CIRCLE)	1138 836
0268 20 1679 0271 0269 60 0622 0627	1679	N M0001 R M0002	20 BLANB 60 87THX	M0004 S8108	8LAN8	STORE EOUIVALENT OF BLANK ADDRESS N. G. OMIT PUNCHING	1180 1182
0270 69 1044 0697		R M0003	69 81STX			BLANK. CHANGE FIRST-CARO TAG)	1184
0271 20 0182 0335 0272 65 0325 0611	0182	N M0004 R M0005	20 P0006 65	SB10C SUB11	P0006	DRUM ADDRESS. STORE FOR PUNCHING NEW SYMBOL. FINO BEST EOUIVALENT	1192 1194
0273 01 0555 0273 0274 20 0182 0385	0182	R M0006 R M0007	01 0555 20 P0006	M0006	P0006	800X ADDRESS. STOP THE MACHINE CORE ADDRESS. STORE FOR PUNCHING	1198 1200
0275 01 0555 0275 0276 69 0197 0950		R M0008 N M0009	01 0555	M0008		OTHER ADORESS. STOP MACHINE EQUIV OF NEW SYMBOL.	1208
0277 00 0000 0269		R M0010	69 ALOPT 00 0000	M0002		NEW SYMBOL BUT SYMBOL TABLE FULL	1210 1216
0278 35 0001 0485 0279 69 1050 0403		J	35 0001 69 1050			ARE LAST FOUR CHARACTERS DIGITS) IS THIS FIRST OUITT SET	1456 574
0280 69 0683 0586 0281 30 0001 0337			69 30 0001	SUB17		CORRECTION TO DYNAMIC LEVEL REPLACE DIGIT OF AVAIL. WORD BY W)	1256 1006
0282 69 0447 0600			69 T2			SPEC. SUBR. BRING BACK BLANB + ORCE8	872
0283 96 0012 0138 0285 11 0488 0493		X	96 ABCOE 11 0			IF WITH I, PROCESS LIKE 08 8RING BACK A SET OF RESULTS)	538 928
0286 69 0139 0018 0287 15 0254 0209		J JUMP C XY	69 15 11STX	SU821		PROCESS I MODIFY ALOPT AGAIN)	586 858
0288 69 0137 0090		N L	69 ENDED	Α.		WITH L. ALTER EXIT)	682
0289 10 0242 0547 0290 10 1689 1002		JY	10 SEND 10 Z0001	A LOOP		BRING BACK A SET OF RESULTS) AOO A SYMBOL INTO UPPER, FROM BOTTOM	920 1508
0291 69 0194 0142 0293 44 0347 0248		N MISC	69 44	SU8R6 OUT		PROCESS I BACKWARDS BRING BACK A SET)	758 654
0295 30 0003 1053 0296 15 0549 0954			30 0003 15 601			MAKE SEVERAL VARIABLE OROERS) INITIAL OF VARIABLE BRINGING ORDER	1062 1638
0297 24 1050 0453	1050	J	24 1050 69	C110.23	1050	CHANGE TAG TO SECOND-CARO TAG)	590
0298 69 0101 0018 0299 22 0901 0404	0901		22 0901	SU821	0901	PROCESS I FORWARDS MODIFY TO TAKE NEXT COLUMN OF TABLE)	774 1104
0300 95 0603 0255 0301 15 0132 0237			95 SHX 15 12NDX			D, NO. I, YES. MODIFY TO USE ROUTINE FOR UNFIXED D)	688 826
0302 10 0405 0309 0303 90 0507 0258			10 0A 90	SKP		CLEAR REGION AND SYMBOL TABLES) D, ONLY ONE.	956 534
0305 24 0177 0080	0177	N SUBR4	24 EXITX		EXITX	STORE EXIT	1172
0306 69 0397 0142 0307 45 0026 0136		J	69 LNM 45 OUITT	SUBR6 B		PROCESS I BACKWARDS IF SO, OUIT SEARCH	768 466
0308 69 1030 0333 0309 46 0112 0213			69 1030 46	OUT		IF SO, WHERE DID WE START CLEAR REGION AND SYMBOL TABLES)	578 958
0310 69 0286 0045		J	69 JUMP	SUB20		PROCESS D	584

0313 46 0166 0178	862 1108 1046
0313 46 0166 0178 46	1046
0314 67 8001 0721 N LH 67 8001 EOUIVALENT IN D POSITION OF LOWER 10 10315 45 0468 0319 45 NO D. NO. I. YES. 0160 00195 0000 P C8 00 0195 0000 MODIFY BRINGING ORDER TO START NEW COL 10 10317 65 0197 0287 J 65 ALOPT XY BRINGING ORDER TO START NEW COL 11 SI INDEXED 0199 69 1030 0457 65 0903 IS INDEXED 0199 69 1030 0433 69 1030 0500 IS INDEXED 0199 0500 IS INDEXED	
0315 45 0468 0319	1548
0316 00 0195 0000 P C8 00 0195 0000 MODIFY BRINGING ORDER TO START NEW COL 10 0317 65 0197 0287 J 65 ALOPT XY BRING ALOPT. AND JUMP BACK 1S I INDEXED 1S I INDEXED 1S I INDEXED 1S I INDEXED 1F SO, WHERE 01D SEARCH START 1S I INDEXED 1S I IN	666
0319 65 0903 0457 0319 69 1030 0433 09 1030 0433 09 1030 0433 09 1030 0433 09 1030 0433 09 1030 0433 09 1030 0433 09 1030 0433 09 1030 0433 09 1030 0433 09 1030 0433 09 1030 0433 09 1030 0437 09 1030	142
0319 69 1030 0433 69 1030 IF SO, WHERE 0ID SEARCH START 0320 00 0000 0050 K 50IXX 00 0050 8003 STORE PROCESSEO CARD) 0321 10 0024 8003 10 8003 STORE PROCESSEO CARD) 0322 20 1355 0000 1355 0 058 20 A0001 0000 A0001 RESTORE COMPARISON CONSTANT AND MODIFY 0323 45 0176 0227 45 LP 0, IT IS NOT I, IT IS. 0325 00 0989 0276 J 00 0989 M0009 TAGS AND EXIT FOR USE IN SUBROUTINE 11 10 10 10 10 10 10 10 10 10 10 10 10	866
0320 00 0000 0050	484
0322 1 0 0024 8003 10	668
0322 20 1355 0000 1355 00 088 20 A0001 0000 A0001 RESTORE COMPARISON CONSTANT AND MODIFY 0323 45 0176 0227 45 LP 0. IT IS NOT. I., IT IS. 15. 0324 10 0427 0331 10 800 SU RESTORE, AND TAKE WORD FROM NEXT LINE 10 0325 00 0989 0276 J 00 0989 M0009 TAGS AND EXIT FOR USE IN SUBROUTINE 11 10 0327 16 0038 0243 16 16THX LOOP BRING BACK A SET J MAKE RRINGING ORDER J 10 0320 16 0153 1108 10 0167 C X1 20 ALOPT ALOPT STORE MODIFIED ALOPT 0330 60 0153 1108 10 108 C SU 21 SA SA STORE WARTABLE STORING ORDER J 10 0332 15 8001 0289 15 8001 BRING BACK A SET OF RESULTS J	2656
0323 45 0176 0227 45 LP 0, IT IS NOT, I, IT IS. 0324 10 0427 0331 10 800 SU RESTORE, AND TAKE WORD FROM NEXT LINE 10 825 00 0989 0276 J 00 0989 M0009 TAGS AND EXIT FOR USE IN SUBROUTINE 11 10 8027 16 0038 0243 16 16THX LOOP BRING 8ACK A SET) 0328 35 0004 0639 35 0004 0639 35 0004 MAKE RINGING ORDER) 0329 20 0197 0350 0197 C X1 20 ALOPT ALOPT STORE MODIFIED ALOPT 90330 60 0153 1108 60 R0003 ALPHARETIC I TO UPPER 10 8031 21 0108 0361 0108 C SU 21 SA SA STORE VARIABLE STORING ORDER 10 8032 15 8001 0289 15 8001 BRING BACK A SET OF RESULTS }	878 986
0324 10 0427 0331 10 800 SU RESTORE, AND TAKE WORD FROM NEXT LINE 10 0325 00 0989 0276 J 00 0989 M0009 TAGS AND EXIT FOR USE IN SUBROUTINE 11 10 0327 16 0038 0243 16 16THX LOOP BRING BACK A SET J 0328 35 0004 0639 35 0004 MAKE RRINGING ORDER J 0329 20 0197 0350 0197 C X1 20 ALOPT ALOPT STORE MODIFIED ALOPT 0330 60 0153 1108 60 R0003 ALPHARETIC I TO UPPER 10 0331 21 0108 0361 0108 C SU 21 SA SA STORE VARIABLE STORING ORDER J 0332 15 8001 0289 15 8001 BRING BACK A SET OF RESULTS J	498
0327 16 0038 0243 16 16THX LOOP BRING 8ACK A SET) 0328 35 0004 0639 35 0004 0639 35 0004 MAKE RRINGING ORDER) 0329 20 0197 0350 0197 C X1 20 ALOPT ALOPT STORE MOOIFIED ALOPT 0330 60 0153 1108 60 R0003 ALPHARETIC I TO UPPER 0331 21 0108 0361 0108 C SU 21 SA SA STORE VARIABLE STORING ORDER) 0332 15 8001 0289 15 8001 BRING BACK A SET OF RESULTS)	1024
0328 35 0004 0639 35 0004 MAKE RRINGING ORDER) 0329 20 0197 0350 0197 C X1 20 ALOPT ALOPT STORE MODIFIED ALOPT 0330 60 0153 1108 60 R0003 ALPHARETIC I TO UPPER 0331 21 0108 0361 0108 C SU 21 SA STORE VARIABLE STORING ORDER 10332 15 8001 0289 15 8001 BRING BACK A SET OF RESULTS)	1196
0329 20 0197 0350 0197 C X1 20 ALOPT ALOPT STORE MODIFIED ALOPT 0330 60 0153 1108 60 R0003 ALPHARETIC I TO UPPER 1 0331 21 0108 0361 0108 C SU 21 SA STORE VARIABLE STORING GROER 1 0332 15 8001 0289 15 8001 BRING BACK A SET OF RESULTS }	642
0330 60 0153 1108 60 R0003 ALPHARETIC I TO UPPER 9 0331 21 0108 0361 0108 C SU 21 SA STORE VARIABLE STORING OROER 9 0332 15 8001 0289 15 8001 BRING BACK A SET OF RESULTS)	1482
0331 21 0108 0361 0108 C SU 21 SA SA STORE VARIABLE STORING OROER 1 0332 15 8001 0289 15 8001 BRING BACK A SET OF RESULTS }	712
0332 15 8001 0289 15 8001 BRING BACK A SET OF RESULTS)	1292
	1026 918
	580
	1414
	1602
0336 95 0032 0012 95 BCOEF ABCDE WITH I. EXIT ACCORDING TO WHY SEARCH	612
0337 10 0304 0359 10 UH SPR REPLACE OIGIT OF AVAIL. WORD BY W)	1008
	746
0339 24 0292 0003 0292 24 0RCEO READC ORCEQ FINISHEO. SAVE SAVOR AS ORCEQ)	938
	1516
0341 69 1679 0232 N 888 69 8LANB SAVE IN CASE I IS 8LANK 0342 20 0391 0335 0391 20 ORCEB SB10C ORCE8 STORE DYNAMIC LEVEL OF CORE ADDRESS	798 1206
0343 24 0184 0137 0184 24 PO008 ENDED PO008 BRING BACK L AND 0)	680
	1272
	1520
0347 10 0250 8002 10 QS 8002 8RING BACK A SET)	656
	846
	1114
	714
0351 16 0132 0287 16 12NOX XY MODIFY ALOPT AGAIN)	856
	1528 1088
0355 69 0182 8002 Q 02 69 P0006 8002 COMPARISON CONSTANT FOR END OF SET	896
0356 65 0109 0113 J 65 SSB 8RING BACK BLANB AND ORCEB	816
	470
0358 69 0211 0164 C A 69 SEN PRESET TO STORE AFTER PROCESSING)	618
0360 69 9999 8003	644
	1028
	1120
0363 15 0228 0583 15 P MAKE SEVERAL VARIABLE ORDERS)	1080
0364 99 0688 0490 99 FD FIBD I, BACKWARD L, BRANCH, UNFIXED D 10365 20 1660 0000 1660 Q QSA 20 G0001 0000 G0001 RESTORE COMPARISON CONSTANT AND MODIFY	1814
0365 20 1660 0000 1660 Q QSA 20 G0001 0000 G0001 RESTORE COMPARISON CONSTANT AND MODIFY 0366 10 1019 1123 10 ODIFF DRUM, ADD RELOCATION AMOUNT	982
	1388 1068
	1298
	1300
0370 69 1669 0772 R J0003 69 ORUMT 8LANK I, IS DRUM FULL	1302
0371 24 0062 0615 0062 N J0004 24 OPREG OPREG DRUM OR DRUM EOUIVALENT	1308
	1314
	1318
	1320
	1322
	1278 908
	1568
	916
0380 11 0254 0559 11 11STX IS FIRST POSITION 8LANK	1376
0381 69 1680 0533 69 ZEROX RU BRING ZERO TO INDICATE RESERVATION	1032
0382 20 1554 1307 1554 J 20 A0200 A0200 MAKE DRUM AVAILABLE)	972
0383 96 0336 0188 96 B D, WITH I. I, WITH L.	610
	1202
0386 69 0189 0142 69 SUBR6 PROCE _S S I BACKWARO 0387 20 1003 0506 1003 20 N N STORE N-1	672
0387 20 1003 0506 1003 20 N N STORE N-1 0388 69 0391 0244 69 ORCEB SAVE IN CASE I IS CORE)	1042 802
	1060
	1620
0392 24 1689 0442 1689 J SS 24 Z0001 Z0001 STORE SYMBOL)	1336
0393 69 0196 0400 N 898 69 SUBR5 PROCESS D BACKWARDS	780
0394 23 1555 0179 1555 P P3 23 E0001 EXITZ E0001 INITIAL OF OWNER TO STORE I-POSITION	1368
	2680
	1662
	762 892
	1472
	1222
0401 10 0658 0363 10 X MAKE SEVERAL VARIABLE ORDERS)	1078
0402 60 0184 0789 N SHOP 60 P0008 SHIFT OPERATION. FORWARD I. BACKW L.	1816
0403 90 0657 0308 90 NO 0, IT IS NOT	576
	1106
0405 20 1661 0000 1661 Q OA 20 GOOO2 0000 GOOO2 COMPARISON CONSTANT 0406 65 0062 0267 J 65 OPREG WHICH L IS LESS, MEASURED ON CIRCLE)	980 834
	480
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	

							650
0408 11 0261 0265		X	11 0	2222		BRING BACK A SET)	2664
D409 00 D0DD 2D00 D41D 69 1124 8DD3		K 2000I O OF	00 0000 69 S00D0	200D 8D03			752
D411 60 D284 0389		C OK	60 XXXXA	8003		MAKE SEVERALVARIABLE ORDERS)	1058
D412 10 80D1 0969		COR	1D 8DD1			RESTORE TO POSITIVE	1380
D413 16 0708 D463			16 C2			IS IT ALSO RIGHT END OF WORD	1096
D414 65 D167 D985		N EVN	65 XXXXI	вотн		EVEN. WE SHOULD USE FIRST ADDEND	1898
D415 46 0178 D569			46 EXITY			MAKE DRUM AVAILABLE)	976
D416 6D D1D8 1D13		N SYM	6D HSYMB			SYMBOLIC ADDRESS. BRING SYMBOL	1496
D417 69 D246 0349		N ZP	69 C1			LAST LINE AND END OF WORD. MODIFY)	1112
0418 69 1015 0661		N LODD1	69 PRE	SUBR7		SUB 11 FOUND EOU OF SYMB. RESERVE	2076
D419 60 D622 D627		R LDD02	60 87THX	SB1DB		N.G. FIX TO OMIT PUNCHING	2078
D42D 69 1669 1224		R LODD3	69 DRUMT			BLANK ADDRESS. IS DRUM FULL	2080
D421 20 0182 1285	0182	N LDDO4	2D PDDO6		PD006	DRUM. STORE ADDRESS FOR PUNCHING	2086
D422 69 103D D983		R L0005	69 1030			NEW SYMBOL. WHERE ARE WE	2094
D423 DO DDDD 0D01		R LDOD6	DO ODDO	SETCC		80DX ADDRESS. OUIT IMMEDIATELY	210 2 2 1 04
D424 20 0182 1335	0182	R LODO7	20 P0D06		30D06	CORE ADDRESS. STORE FOR PUNCHING	
0425 DO 0DDO 0419		R LDD08	00 0000	LD002		MISCELLANEOUS ADDRESS. OUIT AND OMIT	2110 1254
D426 D0 0908 0280	1555	J	00 0908	0000	10001	TAGS AND EXIT FOR SUBROUTINE 13	1134
0427 20 1555 0900	1555	0 800	2D AD201	0900	AUZU1	TO RESTORE FOR NEXT LINE OF TABLE	1842
0428 65 DD0D 0756 0429 10 0382 8003		J	65 0D00 10	8DD3		BRING ADDENDS MAKE DRUM AVAILABLE)	970
0430 69 D154 111D			69 R00D4	8003		CONTROL INFORMATION FOR PUNCHING)	1926
0431 69 D515 D533			69 110TH	RU		BRING UNITY TO INDICATE UNRESERVATION	1036
0432 65 0435 0439			65 LSYMB			SYMBOL-STORING OROER)	133D
0433 96 0386 0288			96	L		D. WITH I. I. WITH L.	67D
0434 71 0177 8D03			71 P0001	8003		D, WITH I. I, WITH L. PUNCH CARD. PERFORM UPPER.	1594
0436 99 0140 0291			99	MISC		MULTIPLE BRANCH ACCORDING TO TAGS)	740
0437 35 D002 0543			35 0002			MAKE SEVERAL VARIABLE ORDERS)	1074
0438 20 1679 0282	1679		24 BLANB		BLANB	SPEC. SUBR. BRING BACK BLANB + ORCEB	870
0439 15 0392 0747			15 SS			SYMBOL-STORING ORDER)	1332
0440 24 0743 0296	0743		24 SW		SW	FORWARD. SET SWITCH OFF FOR 1ST PART	1636
D441 24 0179 D532	D179	N SUB13	24 EXITZ		EXITZ	STORE EXIT	1778
0442 65 0435 0489			65 LSYMB			LOCATION OF EOUIVALENT RELATIVE TO E1	1338
0443 44 0497 0398			44	OUT2		STORE PROCESSED CARD)	888
0444 30 0DD0 0717		J	30 0000			SHIFT MODIFIED WORD BACK INTO PLACE	1728 1532
0445 16 0498 0754			16 JBRL			SUBTRACT INITIAL BRINGING ORDER	1682
0446 65 1354 1020			65 60D	SAI		RESET BRINGING ORDER, AND SEARCH MORE	934
0448 20 D167 0620	0167	N OUT	2D XXXX1	LOOP	XXXX1	STORE MODIFIED BRINGING ORDER + REPEAT	1526
0449 46 D352 0791			46	FULL		I . TARLE IS FULL	806
0450 65 0197 0251			65 ALOPT			ALOPT TO LOWER	1356
0451 10 0554 0509 0452 10 0916 0980			1D P2	A		MAKE STORING ORDER)	2414
0453 60 D206 0D57			10 0 60	CD104		OUPLICATE INTO AVAILABILITY TABLE) PUNCH CARD	592
0454 69 0758 0561			69 C7	SB1DA		LAST INE AND END OF WORD MODIFY)	1116
0455 69 0908 0063			69 PRE	SUBR9		ANALYZE THE ADDRESS	1176
0456 60 0108 0263			60 SA	30017		ARE WE TO LAST LINE OF TABLE)	1018
0457 45 0026 0111			45 OUITT			IF SO, OUIT SEARCH	486
0458 35 0D01 0465			35 D001			REPLACE DIGIT OF AVAIL. WORD BY W)	1000
0459 20 0486 0335	0486		20 SAVOR	SB10C	SAVOR	STORE DYN LEV OF CORE, AND FINISH UP	1276
0460 65 0197 0520		J	65 ALOPT	X0D03		MULTIPLE EXIT, ACCORDING TO KIND	694
D461 11 8001 0367			11 8001			MAKE SEVERAL VARIABLE ORDERS)	1066
0462 16 D038 D793			16 16THX	ST		COMPARISON CONSTANT FOR LAST PART	1642
0463 45 0216 0417			45	ZP		D. NO	1098
0464 15 0515 0514			15 110TH	UM		COUNT OF TAGS IN LOWER	1956
0465 65 8002 0723			65 8002			REPLACE DIGIT OF AVAIL. WORD BY W)	1002
0466 10 1119 0724			10 29IXX			ADD 29	1478 1394
0467 10 8001 1223		N RC	10 8001			CORE ADDRESS. RESTORE THE 2000	686
0468 69 0197 0300		C NO	69 ALOPT			IS D AN ACTUAL ADDRESS	2124
0469 20 1023 0476	1023	N D0001	20 BLANK	80000	BLANK	STORE EOUIV OF BLANK FOR REFERENCE	2126
0470 60 0672 0627 0471 69 0095 0748		R DD002	AN ORTIN	SB10B		N.G. OUIT AND OMIT PUNCHING	2128
0472 69 1226 0677		R D00D3 N 00004	69 OPTIM 69	INDEX		BLANK D. IS IT MDF OPERATION DRUM ADDRESS. INDEX IF TAGGED	2136
0473 65 1276 0611		R DDD05	65	SUB11		DRUM ADDRESS. INDEX IF TAGGED NEW SYMBOL. FIND EOUIVALENT	2140
0474 69 D778 D441		R D00D6	69	SUB13		800X ADORESS. FIND DYNAMIC LEVEL	2144
0475 69 0928 0677		R ODDO7	69	INDEX		CORE ADDRESS. INDEX IF TAGGED	2152
0476 20 D184 1049	0184	R D0008	20 P0D08	В	P0008	MISC ADDRESS, USUALLY A CONSTANT	2164
0477 69 1065 0661		N 00009	69 PRE	SUBR7		STORE EQUIVALENT OF NEW SYMBOL	2170
0478 00 0D00 0470		R 00010	00 0000	D0002		SYMB TABLE FULL OR DRUM PACKED. OUIT	2172
0479 21 0284 0387	0284		21 XXXXA		XXXXA	STORE INITIAL ADDRESS TO BE RESERVED	1040
0480 60 0151 0712			60 R00D1			ALPHARETICAL L TO UPPER	2070
0481 11 8001 0437			11 8001			MAKE SEVERAL VARIABLE OPOERS)	1072 1436
D482 45 0636 0537		** ***	45 ABC			I . THE ADDRESS IS BLANK	936
D483 69 0486 0339		N OVR	69 SAVOR			FINISHED. SAVE SAVOR AS ORCEO)	1618
0484 69 0687 0390		N OI	69 F			PREPARE EXIT AND GO TO SUBROUTINE 13)	1458
0485 44 0416 0240			44 SYM 69	CHESS		ARE LAST FOUR CHARACTERS DIGITS) GET DYNAMIC LEVEL OF CORE ADDRESS	1268
0487 69 019D 0441 0488 24 0186 0285	0186	0 0	24 PD010	SUB13 X	P0010	OLI DIMAMIC LEVEL OF CORE ADDRESS	940
D489 14 D492 1D29	0100	0	14 2DXXX	^	10010	LOCATION OF EQUIVALENT RELATIVE TO E1	1340
D49D 65 0D95 0749		N FIBO	65 OPTIM			FORWARD I OR BACKWARD D. GET ADDENDS	1798
0491 15 D294 0335			15 XXXX2	SB10C		ADD TO GIVE MODIFIED DYNAMIC LEFEL	126D
D492 DO 00D2 DDDD		K 2DXXX	DO D002	D00D		The state of the s	2670
D493 44 0597 0448			44	OUT		BRING BACK A SET OF RESULTS)	930
D494 21 D186 1238	D186		21 PDD10	PROI	PDD1D	FIX C.I. SO THAT D WILL NOT PUNCH)	2282
D495 3D DD06 096D			30 DDD6			SHOULD WE INTERCHANGE ADDENDS)	1856
0496 65 1054 1020			65 799	SAI		START BACK FROM TOP OF TABLE	1696 89D
D497 10 D65D 8003			1D OS2	8003	0.0	STORE PROCESSED CARD)	1584
D499 20 D186 D689	0186		2D PD01D	CUDE	PDOID	C.I. TO PUNCH X-9)	812
050D 69 0753 D4DD			69	SUBR5		PROCESS D BACKWARDS	1626
D5D1 15 8DD2 D909			15 80D2	7.0		4 TIMES DYNAMIC ADDRESS IN D POSITION	2456
0502 10 1019 1232		J	10 DDIFF	ZO		A00 RFLOCATION AMOUNT	

0503 90 0707 0358			90	Α		IF NOT , JUMP AHEAO	606
0504 90 0335 0459			90 SB10C			D. WE SHOULD STORE THIS DYNAMIC LEVEL	1274
0505 69 0908 0661			69 PRE	SUBR7		USUAL CASE. STORE SYMBOL AND EOUIV	1214
0506 11 0409 0313			11 20001			IS INITIAL ADDRESS LESS THAN 2000	1044
0507 69 1030 0283			69 1030	=		WHERE DIO SEARCH START	536
0508 45 0162 0178			45	EXITY		O, WE HAVE NOT FINISHED. I, WE HAVE.	1012
0509 10 0294 0167		CA	10 XXXX2	XXXX1		MAKE STORING OROER)	1358
0510 65 0197 0527		J	65 ALOPT	X0010		MULTIPLE EXIT	718
0511 22 0359 0262	0359		22 SPR		SPR	MAKE SEVERAL VARIABLE ORDERS)	1090
0512 15 0765 1020			15 800	SAI		AOVANCE VARIABLE BRINGING ORDER	1654
0513 11 0266 0331 0514 20 0545 0598	0545	C 1114	11 C6	su	COLINIT	MODIFY TO TAKE FIRST LINE, SAME COLUMN	1110
	0545	C UM	20 COUNT		COUNT	STORE TAG-COUNT	1958
0515 00 0000 0001		K 110TH	00 0000	0001		AFTER RESTART. BRING BRINGING OROER	2644
0516 65 0346 0651		J ON C NZ	65 AI 10 8001			WIDONG CAMOOL DESTONE HODER TO BILLS	1684
0517 10 8001 1323		R X0001	10 8001 15 13RD	V1		WRONG SYMBOL. RESTORE UPPER TO PLUS AGORESS N G. CALL UNFIXED	1428
0518 15 0075 0329		R X0001		X1		BLANK ADDRESS. IS THIS FIRST CARD	698 700
0519 69 1050 0653 0520 00 0000 0329		R X0003	69 1050 00 0000	×1		ORUM, OLD SYMB, REG. FIXED	704
0521 15 0075 0329		R X0004	15 13R0	X1		NEW SYMBOL - UNFIXED	706
0522 15 0075 0329		R X0005	15 13RD	x1		800X CALL IT UNFIXED	696
0523 00 0000 0519		R X0006	00 0000	X0002		CORE. TREAT SAME AS BLANK	708
0524 00 0000 0329		R X0007	00 0000	X1		OTHER AODRESS. FIXEO	710
0525 15 0132 0187		R X0008	15 12NDX	X2		O IS N G. CALL UNFIXED	722
0526 69 1050 0703		R X0009	69 1050			BLANK. IS THIS FIRST CARO	724
0527 00 0000 0081		R X0010	00 0000	F		OLO SYMBOL, ORUM, REGION. FIXED	728
0528 15 0132 0187		R X0011	15 12NOX	X2		NEW SYMBOL. UNFIXED	730
0529 15 0132 0187		R X0012	15 12NOX	X2		800X AOORESS. UNFIXEO	720
0530 91 0526 0525		R X0013	91 X0009	X0008		CORE. BRANCH, LIKE BLANK, ARITH, UNF	732
0531 01 0666 0531		R X0014	01 0666	X0014		OTHER. ERROR. SHOULD NOT BE HERE.	734
0532 95 0735 0787			95	9		O, O ADORESS. I, FORWARO I OR BACKW L	1780
0533 24 0326 0479	0326	C RU	24 W		W	STORE 0 OR 1	1038
0534 69 0737 0440			69 OFF			FORWARD. SET SWITCH OFF FOR 1ST PART	1634
0535 30 0001 0641			30 0001			THEY ARE OIGITS. GET VALUE)	1466
0537 61 0515 1069			61 110TH	OON		MODIFY EXIT AND PREPARE TO OUIT	1438
0538 00 0909 0342		J	00 0909			TAGS AND EXIT FOR USE IN SUBR 13	1204
0539 46 0542 0977			46	BAO		I RELOCATED CORE ADDRESS TOO HIGH	1400
0540 04 0000 0000		K 42N0	04 0000	0000			1918
0541 35 0004 0451			35 0004			SHIFT TO 0 POSITION	1354
0542 10 8001 0713			10 8001	RES		RESTORE THE 9060	1402
0543 10 8003 0401			10 8003			MAKE SEVERAL VARIABLE ORDERS)	1076
0544 21 0186 1338	0186	N N7	21 P0010	ALL EXITY	P0010	FIX C.I. SO THAT I WILL NOT PUNCH)	2302
0546 67 8003 0178 0547 15 0038 8002		N NZ	67 8003			IF NOT 8001 CORRECTION IS ZERO	2020
		CA	15 16THX 93	8002		BRING BACK A SET OF RESULTS)	922
0548 93 1101 0785 0549 60 1356 1088		D 401		SEO TA		O, OPERATION 31. I. 30,35.36.	1828
0550 69 0953 0142		P 601	60 A0002 69	SUBR6		PROCESS I BACKWAROS	1766
0551 16 1054 1009		SWOF	16 799	30000		SUBTRACT END OF TABLE	830
0552 15 1266 0784		3#01	15 799 15 ST			MAKE STORING OROER	1650 2488
0554 22 1555 0179	1555	P P2	22 E0001	EXITZ	F0001	INITIAL OF ORDER TO STORE 0-POSITION	1366
0555 20 0167 0670	0167		20 XXXX1	CALL		MAKE BRINGING OROER)	1348
0556 00 0989 0268	010.		00 0989	M0001	***************************************	TAGS AND EXIT FOR SUBROUTINE 11	1190
0557 10 0260 0215			10 BRNG	110001		NOT 1ST CARO. MAKE COMP. CONST.)	546
0558 46 0411 0212			46 OK			I . LAST ONE WOULD BE OVER 1999	1050
0559 46 0412 0613			46	FXT		I. FIRST IS NON-BLANK. FIXEO ADORESS.	1378
0560 65 0163 0113			65	SSB		BRING BACK BLANB AND ALOPT ONCE MORE	850
0561 24 0359 0362	0359		24 SPR		SPR	LAST LINE AND END OF WORD. MODIFY)	1118
0562 15 0038 0793			15 16THX	ST		COMPARISON CONSTANT FOR LAST PART	1666
0563 11 0316 0331			11 C8	SU		LAST LINE AND END OF WORD. MODIFY)	1122
0564 65 0902 0662		J	65 0902			BRING APPROPRIATE TAG	2044
0565 20 1355 0900	1355	P C3	20 A0001	0900		INITIAL OF STORING OROER	1128
0566 22 0183 0986	0183		22 P0007				
0567 11 8003 0725		C 1 00			P0007	STORE OPERATION FOR PUNCHING	1934
0568 00 0001 0375		C L00	11 8003		P0007	ARE LAST FOUR CHARACTERS OIGITS)	1934 1452
0569 10 0322 8003		J	00 0001	J0008	P0007	ARE LAST FOUR CHARACTERS OIGITS) ACCEND AND EXIT FOR SUBROUTINE 18	1934 1452 1312
			00 0001 10 0SB	8003	P0007	ARE LAST FOUR CHARACTERS OIGITS) AOOEND AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE)	1934 1452 1312 978
0570 65 0553 0243			00 0001 10 058 65 VAR		P0007	ARE LAST FOUR CHARACTERS OIGITS) AOOEND AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER• BACK FOR ANOTHER CARO	1934 1452 1312 978 894
0570 65 0553 0243 0571 69 0074 0377	1000	J	00 0001 10 058 65 VAR 69 BRNG	8003 LOOP		ARE LAST FOUR CHARACTERS OIGITS) AOOEND AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER)	1934 1452 1312 978 894 906
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577	1023	J N 10001	00 0001 10 058 65 VAR 69 BRNG 20 BLANK	8003 LOOP		ARE LAST FOUR CHARACTERS 01GITS) AGOEND AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING ORDER. BACK FOR ANOTHER CARO MAKE NEW BRINGING ORDER) STORE EOUIVALENT OF BLANK FOR REFERENC	1934 1452 1312 978 894 906 2186
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627	1023	N 10001 R 10002	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX	8003 LOOP		ARE LAST FOUR CHARACTERS OIGITS) AODEND AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING ORDER. BACK FOR ANOTHER CARO MAKE NEW BRINGING ORDER) STORE EOUIVALENT OF BLANK FOR REFERENC N.G. OUIT AND OMIT PUNCHING	1934 1452 1312 978 894 906 2186 2188
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0574 60 0152 1012	1023	N 10001 R 10002 R 10003	00 0001 10 05B 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002	8003 LOOP IOOO6 SB10B		ARE LAST FOUR CHARACTERS OIGITS) AOOEND ANO EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER. BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO, BLANK	1934 1452 1312 978 894 906 2186 2188
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0574 60 0152 1012 0575 69 1028 0677	1023	N 10001 R 10002 R 10003 N 10004	00 0001 10 OSB 65 VAR 69 BRNG 20 BLANK 60 B9THX 60 R0002 69	B003 LOOP I0006 SB10B INOEX		ARE LAST FOUR CHARACTERS 01GITS) AOOEND AND EXIT FOR SUBROUTINE 1B MAKE DRUM AVAILABLE) BRINGING ORDER. BACK FOR ANOTHER CARO MAKE NEW BRINGING ORDER) STORE EOUIVALENT OF BLANK FOR REFERENC N.G. OUIT AND OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM ADORESS. INDEX IF TAGGEO	1934 1452 1312 978 894 906 2186 2188 2190 2204
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0574 60 0152 1012 0575 69 1028 0677 0576 65 0979 0611		N 10001 R 10002 R 10003 N 10004 R 10005	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69	B003 LOOP I0006 SB10B IN0EX SUB11	BLANK	ARE LAST FOUR CHARACTERS OIGITS) AOOEMD AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER , BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE.	1994 1452 1312 978 894 906 2186 2188 2190 2204
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177	1023 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006	00 0001 10 05B 65 VAR 69 BRNG 20 BLANK 60 B9THX 60 R0002 69 65 20 P0009	BOO3 LOOP IOOO6 SB10B INOEX SUB11 EXITX	BLANK	ARE LAST FOUR CHARACTERS OIGITS) AOOEND ANO EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER. BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT AND OMIT PUNCHING BLANK I. IS O ALSO BLANK ROUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX ADDRESS. STORE AND EXIT	1934 1452 1312 978 894 906 2188 2190 2204 2208
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0574 60 0122 1012 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677	0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007	00 0001 10 OSB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 65 20 P0009	B003 L00P I0006 SB10B IN0EX SUB11 EXITX INDEX	BLANK P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEND ANO EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER, BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EOUTVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE AODRESS. INDEX IF TAGGEO	1934 1452 1312 978 894 906 2188 2190 2204 2208 2212
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0152 1012 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677 0578 69 1331 0677 0579 20 0185 0177	0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10008	00 0001 10 05B 55 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 20 P0009 69 20 P0009	BOO3 LOOP IOOO6 SB10B INOEX SUB11 EXITX	8LANK P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEND ANO EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER. BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM ACORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX ACORESS. STORE AND EXIT CORE ACORESS. STORE AND EXIT.	1994 1452 1312 978 894 906 2186 2188 2190 2204 2208 2212 2214
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0574 60 0152 1012 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677 0579 20 0185 0177 0580 20 0185 0178 0580 20 0185 0988	0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10008 N 10009	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 B9THX 60 R0002 69 65 20 P0009 69 20 P0009	BO03 LOOP IOOO6 SB10B INOEX SUB11 EXITX INDEX EXITX	8LANK P0009 P0009	ARE LAST FOUR CHARACTERS 01GITS) AOOEND ANO EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER, BACK FOR ANOTHER CARO MAKE NEW BRINGING GROER) STORE EOUTVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL, FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT STORE EOUTVALENT OF NEW SYMBOL	1934 1452 1312 978 894 906 2188 2190 2204 2208 2212 2214 2226
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0152 1012 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677 0578 69 1331 0677 0579 20 0185 0177	0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10008	00 0001 10 05B 55 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 20 P0009 69 20 P0009	B003 L00P I0006 SB10B IN0EX SUB11 EXITX INDEX	8LANK P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEMD AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER , BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR	1994 1452 1312 978 894 906 2186 2188 2190 2204 2208 2212 2214
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0575 69 1028 0677 0575 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677 0579 20 0185 0187 0579 20 0185 0185 0988 0581 00 0000 0573	0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10008 N 10009	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 R0002 69 65 20 P0009 20 P0009 20 P0009 00 0000	BO03 LOOP IOOO6 SB10B INOEX SUB11 EXITX INDEX EXITX	8LANK P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEND ANO EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER. BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. QUIT AND OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE ADDRESS. STORE AND EXIT CORE ADDRESS. STORE AND EXIT STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O. FORWARO. I, BACKWARD.	1994 1452 1312 978 894 906 2188 2190 2204 2212 2214 2226 2222 2224
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677 0578 69 1331 0677 0578 69 1351 0677 0580 20 0185 0177 0580 20 0185 0177 0580 20 0185 0938 0581 00 0000 0573 0582 97 0935 0937 0583 35 0040 0593 0584 98 8009 0000	0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10008 N 10009	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 65 20 P0009 20 P0009 20 P0009 7 P.	BO03 LOOP IOOO6 SB10B INOEX SUB11 EXITX INDEX EXITX	8LANK P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEMD AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER , BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR	1934 1452 1312 978 894 906 2188 2190 2204 2208 2212 2214 2226 2228 2232 1852
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0574 60 0152 1012 0575 69 1028 0677 0576 65 0579 0611 0577 20 0185 0177 0578 69 1031 0677 0579 20 0185 0177 0580 20 0185 0988 0581 00 0000 0573 0582 35 0004 0593 0584 98 8009 0000 0585 69 0038 0741	0185 0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 65 20 P0009 20 P0009 20 P0009 20 P0009 35 0004 98 8009 69 16THX	BOO3 LOOP IOOO6 SB10B INOEX SUB11 EXITX INDEX EXITX IOOO2	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEND ANO EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER, BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EOUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT. STORE EOUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O. FORWARO. I, BACKWARO. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1)	1934 1452 1312 978 894 906 2188 2190 2204 2208 2212 2214 2226 2228 2232 1852 1082 1986 1502
0570 65 0553 0243 0571 0572 20 1023 0577 0573 60 0722 0627 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677 0578 69 1331 0677 0578 69 1351 0677 0580 20 0185 0988 0581 00 0000 0573 0582 97 0935 0937 0582 97 0935 0937 0584 98 8009 0000 0585 69 038 0741 0586 24 0178 1231	0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10008 R 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 65 20 P0009 20 P0009 20 P0009 20 P0009 37 P. 35 0004 98 8009 69 16THX 24 EXITY	B003 L00P I0006 SB10B IN0EX SUB11 EXITX INDEX EXITX I0002	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AODEMD AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER, BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM ADORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE ADDRESS. STORE AND EXIT CORE ADDRESS. STORE AND EXIT. STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O. FORWARO. I, BACKWARO. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1 STORE EXIT INSTRUCTION	1994 1452 1312 978 894 906 2186 2118 2190 2204 2208 2212 2214 2226 2228 2232 1852 1986 1502
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0574 60 0152 1012 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677 0578 69 1331 0677 0578 02 0185 0177 0580 20 0185 0988 0581 00 0000 0573 0582 35 0004 0593 0583 35 0004 0593 0584 98 8009 0000 0585 69 0038 0741 0586 24 0178 1231 0587 65 0290 8001	0185 0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 20 P0009 20 P0009 20 P0009 7 P. 35 0004 98 8009 69 16THX 24 EXITY 65 Y	BOO3 LOOP IOOO6 SB10B INOEX SUB11 EXITX INDEX EXITX IOOO2	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS 01GITS) AOOEND ANO EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER. BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. QUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM ACORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX ACORESS. STORE AND EXIT CORE ACORESS. STORE AND EXIT CORE ACORESS. STORE AND EXIT STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O, FORWARO. I, BACKWARD. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1 STORE EXIT INSTRUCTION BRINGING ORDER INTO LOWER	1934 1452 1312 978 894 906 2188 2190 2204 2208 2212 2214 2226 2228 2232 1852 1082 1986 1502
0570 65 0553 0243 0571 69 0074 0377 0573 60 0722 0627 0573 60 0722 0627 0575 69 1028 0677 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 1391 0677 0578 20 0185 0177 0580 20 0185 0978 0581 00 0000 0573 0582 97 0593 0937 0588 98 8009 0000 0585 69 0038 0741 0586 24 0178 1231 0587 65 209 8001 0588 69 0038 0741 0586 24 0178 1231 0587 65 209 8001 0588 69 0038 0741 0586 24 0791 0642	0185 0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 65 20 P0009 20 P0009 20 P0009 20 P0009 35 0004 98 8009 69 16THX 24 EXITY 65 Y 46 FULL	B003 L00P I0006 SB10B IN0EX SUB11 EXITX INDEX EXITX I0002	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEMD AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER, BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM ACORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. 800X ADDRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O, FORWARO. I, BACKWARO. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1) STORE EXIT INSTRUCTION BRINGING ORDER INTO LOWER O, TABLE IS FULL	1934 1452 1312 978 894 906 2188 2190 2208 2212 2214 2226 2228 2232 1852 1986 1502 1992
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 131 0677 0578 69 131 0677 0578 69 131 0677 0578 20 0185 0177 0580 20 0185 0988 0581 00 0000 0573 0582 97 0935 0937 0582 97 0935 0937 0583 35 0004 0593 0583 35 004 0593 0585 69 0038 0741 0586 24 0178 1231 0587 65 0290 8001 0588 46 0791 0642 0588 46 0791 0642	0185 0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 65 20 P0009 20 P0009 20 P0009 20 P0009 35 0000 97 P 35 0004 8009 69 16THX 24 EXITY 65 Y 46 FULL 10 XXXX2	B003 L00P I0006 SB10B IN0EX SUB11 EXITX INDEX EXITX I0002	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOGEND AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER. BACK FOR AND THER CARD MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT AND OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O. FORWARO. I. BACKWARO. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1 STORE EXIT INSTRUCTION BRINGING ORDER INTO LOWER O. TARLE IS FULL FIRST CHARACTER INTO UPPER	1934 1452 1312 978 894 906 2188 2190 2204 2208 2212 2214 2226 2228 2232 1082 1986 1502 1996
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0574 60 0152 1012 0575 69 1028 0677 0576 65 0579 0611 0577 20 0185 0177 0578 69 1331 0677 0578 69 1331 0677 0578 69 1331 0677 0580 20 0185 0988 0581 00 0000 0573 0582 97 0935 0937 0583 35 0004 0593 0583 35 0004 0593 0584 69 038 0741 0586 24 0178 1231 0587 65 0290 8001 0588 46 0791 0642 0589 10 0294 0399 0590 65 0800 1306	0185 0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 20 P0009 20 P0009 20 P0009 20 P0009 97 P. 35 0004 98 0004 98 EXITY 65 Y 46 FULL 10 XXXX2 65 0800	B003 LOOP IO006 SB108 INOEX SUB11 EXITX INDEX EXITX IO002	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEND ANO EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER, BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EOUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX ADDRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT STORE EOUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O, FORWARO. I, BACKWARO. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1) STORE EXIT INSTRUCTION BRINGING ORDER INTO LOWER O, TARLE IS FULL FIRST CHARACTER INTO UPPER BRING OPTIMIZING ADDENDS AND TAGS	1934 1452 1312 978 894 906 2188 2190 2204 2208 2212 2214 2226 2228 2232 1852 1986 1502 1992 1506
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0575 69 1028 0677 0576 60 0152 1012 0577 20 0185 0177 0578 69 1331 0677 0578 69 1331 0677 0578 69 1331 0677 0578 20 0185 0187 0580 20 0185 0978 0581 00 0000 0573 0582 97 0935 0937 0582 97 0935 0937 0582 98 0000 0593 0583 69 038 0741 0588 49 8 8009 0000 0585 69 038 0741 0588 64 0791 0642 0589 10 0294 0399 0590 65 080 1306 0591 10 0394 0509	0185 0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 65 20 P0009 20 P0009 20 P0009 20 P0009 37 P. 35 0000 97 P. 35 0004 98 8009 69 16THX 24 EXITY 65 Y 46 FULL 10 XXXX2 65 0800 10 P3	B003 L00P I0006 SB10B IN0EX SUB11 EXITX INDEX EXITX I0002	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AODEMD AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER, BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO, BLANK ORUM ADORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX ADDRESS. STORE AND EXIT CORE ADORESS. STORE AND EXIT CORE ADORESS. STORE AND EXIT. STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O. FORWARO. I. BACKWARO. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1 STORE EXIT INSTRUCTION BRINGING ORDER INTO LOWER O. TARLE IS FULL FIRST CHARACTER INTO UPPER BRING OPTIMIZING ADDRONS AND TAGS MAKE STORING OROER	1934 1452 978 884 906 2188 2190 2204 2208 2212 2214 2226 2228 2228 2228 2232 1852 1082 1986 1502 1992 1506
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0574 60 0152 1012 0575 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677 0578 69 1331 0677 0578 69 1331 0677 0580 20 0185 0988 0581 00 0000 0573 0582 35 0004 0593 0582 35 0004 0593 0583 35 0004 0593 0584 98 8009 0000 0585 69 0038 0741 0585 69 0038 0741 0586 24 0178 1231 0587 65 0290 8001 0588 46 0791 0642 0589 10 0294 0399 0590 65 0800 1306 0591 10 0394 0509 0592 65 1660 0665	0185 0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 20 P0009 20 P0009 20 P0009 7 P. 35 0004 98 8009 69 16THX 24 EXITY 65 FY 46 FULL 10 XXXX2 65 0800 10 P3 65 G0001	B003 LOOP IO006 SB108 INOEX SUB11 EXITX INDEX EXITX IO002	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEND ANO EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER, BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EOUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO, BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT STORE EOUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR OF FORWARO. I. BACKWARO. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1 STORE EXIT INSTRUCTION BRINGING ORDER INTO LOWER O, TARLE IS FULL FIRST CHARACTER INTO UPPER BRING OPTIMIZING AODENDS AND TAGS MAKE STORING OROER BRING GOULYALENT OF REGION	1934 1452 1312 978 894 906 2188 2190 2204 2208 2212 2214 2226 2228 2232 1852 1986 1502 1992 1506 1502 1470
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0575 69 1028 0677 0576 60 0152 1012 0577 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677 0578 69 1331 0677 0578 69 1331 0677 0580 20 0185 0177 0580 20 0185 0177 0582 97 0935 0937 0582 97 0935 0937 0582 98 0004 0593 0583 69 0038 0741 0586 24 0178 1231 0587 65 290 8001 0588 10 0294 0399 0590 65 0800 1306 0591 10 0394 0590 0592 65 1660 0665 0593 69 0246 0249	0185 0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10009 N 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 20 P0009 20 P0009 20 P0009 20 P0009 35 0000 97 P. 35 0004 98 8009 69 16THX 65 Y 66 FULL 10 XXXX2 65 0800 10 P3 65 G0001	B003 LOOP IO006 SB108 INOEX SUB11 EXITX INDEX EXITX IO002	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEMD AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER, BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO, BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O. FORWARO. I, BACKWARO. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1) STORE EXIT INSTRUCTION BRINGING ORDER INTO LOWER O. TARLE IS FULL FIRST CHARACTER INTO UPPER BRING OPTIMIZING AODENDS AND TAGS MAKE STORING OROER BRING EQUIVALENT OF REGION MAKE SEVERAL VARIABLE ORDERS)	1934 1452 1312 978 894 906 2188 2190 2208 2212 2214 2226 2228 2232 1852 1986 1502 1992 1506 1522 1470 1964
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0575 69 1028 0677 0576 69 1028 0677 0576 65 0979 0611 0577 20 0185 0177 0578 69 131 0677 0578 69 131 0677 0578 69 131 0677 0580 20 0185 0177 0580 20 0185 0988 0581 00 0000 0573 0582 97 0935 0937 0583 35 0004 0593 0583 69 0004 0593 0585 69 0004 0593 0586 69 0178 1231 0587 65 0290 8001 0588 46 0719 0642 0598 69 0800 1306 0591 10 0394 0509 0592 65 1660 0665 0593 69 0246 0249 0593 69 0246 0249 0594 66 0095 1099	0185 0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 20 P0009 20 P0009 20 P0009 7 P. 35 0004 98 8009 69 16THX 24 EXITY 66 FULL 10 XXXX2 65 0800 10 P3 65 G0001 69 C1	B003 L00P I0006 SB10B IN0EX SUB11 EXITX INDEX EXITX I0002	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOGEND AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER. BACK FOR ANDHER CARD MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT AND OMIT PUNCHING BLANK I. IS O ALSO BLANK ORUM ADORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX ADDRESS. STORE AND EXIT CORE ADDRESS. STORE AND EXIT CORE ADDRESS. STORE AND EXIT STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O. FORWARO. I. BACKWARO. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1 STORE EXIT INSTRUCTION BRINGING ORDER INTO LOWER O. TARLE IS FULL FIRST CHARACTER INTO UPPER BRING OPTIMIZING ADDERDS AND TAGS MAKE STORING ORDER BRING POTIMIZING ADDERDS AND TAGS MAKE STORING ORDER BRING EQUIVALENT OF REGION MAKE SEVERAL VARIABLE ORDERS) BRING STORING ORDER BRING EQUIVALENT OF REGION MAKE SEVERAL VARIABLE ORDERS) BRING SYMBOL—EQUIVALENT TO UPPER BRING EQUIVALENT OF REGION MAKE SEVERAL VARIABLE ORDERS) BRING SYMBOL—EQUIVALENT TO UPPER	1934 1452 1312 978 894 906 2188 2190 2204 2208 2212 2214 2226 2228 2232 1082 1502 1992 1506 1502 1470 1486 1084
0570 65 0553 0243 0571 69 0074 0377 0572 20 1023 0577 0573 60 0722 0627 0575 69 1028 0677 0576 60 0152 1012 0577 65 0979 0611 0577 20 0185 0177 0578 69 1331 0677 0578 69 1331 0677 0578 69 1331 0677 0580 20 0185 0177 0580 20 0185 0177 0582 97 0935 0937 0582 97 0935 0937 0582 98 0004 0593 0583 69 0038 0741 0586 24 0178 1231 0587 65 290 8001 0588 10 0294 0399 0590 65 0800 1306 0591 10 0394 0590 0592 65 1660 0665 0593 69 0246 0249	0185 0185 0185	N 10001 R 10002 R 10003 N 10004 R 10005 R 10006 R 10007 R 10009 N 10009 R 10010	00 0001 10 0SB 65 VAR 69 BRNG 20 BLANK 60 89THX 60 R0002 69 20 P0009 20 P0009 20 P0009 20 P0009 35 0000 97 P. 35 0004 98 8009 69 16THX 65 Y 66 FULL 10 XXXX2 65 0800 10 P3 65 G0001	B003 LOOP IO006 SB108 INOEX SUB11 EXITX INDEX EXITX IO002	BLANK P0009 P0009 P0009	ARE LAST FOUR CHARACTERS OIGITS) AOOEMD AND EXIT FOR SUBROUTINE 18 MAKE DRUM AVAILABLE) BRINGING OROER, BACK FOR ANOTHER CARO MAKE NEW BRINGING OROER) STORE EQUIVALENT OF BLANK FOR REFERENC N.G. OUIT ANO OMIT PUNCHING BLANK I. IS O ALSO, BLANK ORUM AOORESS. INDEX IF TAGGEO NEW SYMBOL. FIND BEST VALUE. BOOX AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT CORE AODRESS. STORE AND EXIT STORE EQUIVALENT OF NEW SYMBOL SYMBOL TABLE FULL. OMIT PUNCHING ADOR O. FORWARO. I, BACKWARO. MAKE SEVERAL VARIABLE OROERS) PRESET T AS POSITIVE 1) STORE EXIT INSTRUCTION BRINGING ORDER INTO LOWER O. TARLE IS FULL FIRST CHARACTER INTO UPPER BRING OPTIMIZING AODENDS AND TAGS MAKE STORING OROER BRING EQUIVALENT OF REGION MAKE SEVERAL VARIABLE ORDERS)	1934 1452 1312 978 894 906 2188 2190 2208 2212 2214 2226 2228 2232 1852 1986 1502 1992 1506 1522 1470 1964

0597 10 0700 0547			10 QS	Α		BRING BACK A SET OF RESULTS)	932
0598 60 0183 1237			60 P0007			OPERATION IN D OF UPPER	1960
0599 60 1357 1088		P 602	60 A0003	TA			1768
0600 24 0391 8002	0391		24 ORCEB	8002	ORCEB	SPEC . SUBR . BRING BACK BLANB + ORCEB	
0601 16 1354 1059			16 600			SUBTRACT COMPARISON CONSTANT	1672
0602 20 0184 1340	0184		20 P0008		P0008	STORE NEXT 4 DIGITS IN D POSITION	2540
0603 69 0306 0045 0604 16 1208 0913		N SHX	16 600 20 P0008 69 16 909 35 0006 16 Y 24 R0005 44 16 KA 20 A0002	20820		PROCESS D FORWARDS	766
0605 35 0006 0970			16 909			SUBTRACT 9090908995 SHIFT TO REMOVE TABULAR ADDRESS) SYMB NOT IN TABLE. SUBTRACT Y COMPARISON CONSTANT FOR BRINGING SET I, IT IS ZERO AND WE HAVE FINISHED RESTORE LOWER, AND ADD NEXT SYMBOL COMPARISON CONSTANT	1448
0606 16 0290 0345		N UND	16 Y			SYMB NOT IN TARIF. SURTRACT V	1570 1518
0607 20 0155 0204	0155	QO	24 R0005	x	R0005	COMPARISON CONSTANT FOR BRINGING SET	596
0608 44 1316 0001	0.00	R U0001	44	SETCC		I. IT IS ZERO AND WE HAVE FINISHED	2502
0609 16 1218 8002		R U0002	16 KA	8002		RESTORE LOWER, AND ADD NEXT SYMBOL	2512
0610 20 1356 0000	1356	O QB	20 A0002	8002 0000	A0002	COMPARISON CONSTANT	984
0611 69 1669 1072		N SUB11				IS THE DRUM FULL	1608
0612 15 0915 1020			15 599	SAI EXITX		RESTORE AND MODIFY	1676
0613 65 8002 0177		N FXT	65 8002	EXITX		FIXEO ADDRESS. CLEAR UPPER AND EXIT.	1410
0614 10 0152 1312			10 R0002			ALPHARETIC 0	2266
0615 69 0568 0677			69	INDEX		TO SURROUTINE 18 TO INDEX	1310
0616 69 1669 1274	1//0		69 ORUMI		001447	BLANK D AND I. CHECK ORUM TAG	2194
0617 24 1669 1122	1669		24 URUMI	DEE	ORUMI	D. IT WAS NOT DIGHT ONE . I. IT AS	1702
0618 46 0517 0972 0619 20 1003 0456	1003		20 N	DEF	NI.	DECLICE NUMBER VET TO BE DONE !	1426
0620 60 0673 0057	1003	C LOOP	20 N	SRIDA	14	TO SUB 104 TO PUNCH ONE CAPD	1016 910
0621 16 0174 0379			60 16 QL	30104		ALPHARETIC 0 TO SUBROUTINE 18 TO INDEX BLANK D AND I. CHECK ORUM TAG CHANGE DRUM TAG TO 9) D. IT WAS NOT RIGHT ONE . I. IT AS. REOUCE NUMBER YET TO BE DONE) TO SUB 10A TO PUNCH ONE CARD BRING BACK A SET OF RESULTS)	914
0622 00 0000 8000		K 87THX	00 0000	8000		DATE OF THE SET OF THE SET OF	
0623 45 0226 0160			45	8000 R0010		IF SO, MULTIBRANCH + EXIT FROM QUITT TAG-IDENTIFICATION, AND EXIT FROM 18 EXIT AND TAGS FOR SUBROUTINE 11	570
0624 00 0000 0376		J	00 0000	Α		TAG-IDENTIFICATION, AND EXIT FROM 18	1246
0625 00 0988 0926		Ĵ	00 0988	C0009		EXIT AND TAGS FOR SUBROUTINE 11	1250
0626 65 1679 0371			65 BLANB	J0004		BRING EQUIVALENT OF BLANK BACKWARO L	1306
0627 10 0186 0941		N SB10B	10 P0010			FROM 4-6,19-21. TO SUPPRESS)	1596
0628 20 0903 1106	0903		20 0903		0903	BRING BACK A SET OF RESULTS) IF SO, MULTIBRANCH + EXIT FROM OUITT TAG-IDENTIFICATION, AND EXIT FROM 18 EXIT AND TAGS FOR SUBROUTINE 11 BRING EQUIVALENT OF BLANK BACKWARO L FROM 4-6+19-21. TO SUPPRESS) STORE I TAG ALSO STORE FIRST LETTER OF ADORESS) ALPHABETICAL D INTO UPPER STORE CORE ADDRESS FOR PUNCHING IF BACKWARD L, SUBTRACT TAG-COUNT) BRING EQUIV AND MULTIBRANCH OUPLICATE INTO AVAILABILITY TABLE) ADVANCE CADD NUMBER)	1946
0629 21 0294 0947	0294		21 XXXX2		XXXX2	ALSO STORE FIRST LETTER OF ADORESS)	1444
0630 60 0152 0762			60 R0002		0.0	ALPHARETICAL D INTO UPPER	2118
0631 20 0184 0487	0184		20 P0008		P0008	STORE CORE ADORESS FOR PUNCHING	1266
0632 95 1085 1087			95 CP	F0000		IF BACKWARD L, SUBTRACT TAG-COUNT)	1908
0633 65 0536 0220		3	05 EQUIV	F 0 0 0 3		OUDLIGATE THIS AVAILABILITY TABLE A	1152
0634 11 8001 8002			11 8001	8002		ADVANCE CARD NUMBER A	2418
0635 15 1022 1027 0636 21 0108 0961	0108		10 ZIXXX		HEVMB	ADVANCE CARD NUMBER) ADDRESS NOT BLANK. STORE SYMBOL	1590 1440
0637 65 0340 8001	0108	N ABC	21 maimb	8001	пэтмо	BRINGING OROER INTO LOWER	1514
0638 14 0492 0904			14 20 8 8 8	3001		DIVIDE BY 2	1536
0639 10 0592 8003			10	8003		MAKE BRINGING ORDER)	1484
0640 65 1043 1347		N XY	65 8001	0003		8001 INTO RIGHT END LOWER	2012
0641 20 0536 0589	0536		20 EQUIV		EQUIV	STORE THESE 4 DIGITS	1468
0642 16 0395 0449			16 ZTABL				
0643 20 0384 0637	0384		10 SEND 24 SAVOR 20 DDIFF 24 DRUMT 69 POINT 69 P		Т	SHORT. PRESET T AS -1) DUPLICATE INTO AVAILABILITY TABLE) STORE ORCEO FOR USE WHEN WE START FORW STORE DRUM RELOCATION AMOUNT	1512
0644 61 1248 0966		N ALL	61 SEND			DUPLICATE INTO AVAILABILITY TABLE)	2420
0645 2 0486 8002	0486		24 SAVOR	8002	SAVOR	STORE ORCEQ FOR USE WHEN WE START FORW	2242
0646 20 1019 0696	1019	C SDO	20 DDIFF		OOIFF		
0647 24 1669 0072	1669		24 DRUMT		ORUMT	PRESET DRUM TAG)	966
0648 69 8003 1261			69 8003			CLEAR OISTRIBUTOR	1968
0649 19 0320 1074		0 QS2	19 501XX	0000		WHAT CELL DID WE RESERVE I	1756
0650 69 0181 8002 0651 16 1097 0701		0 032	16 A0	8002		PRESET DRUM TAG) CLEAR OISTRIBUTOR WHAT CELL DID WE RESERVE) RESTORE CONSTANT AND MODIFY COMPARISON CONSTANT, SUBTRACTED STORE LOCATION OF AVAILABILITY WORD FIRST UNFIXED. OTHER, FIXED.	898 1 6 86
0652 20 0183 8003	0183		20 P0007 90 X1	8003	POOOT	COMPARISON CONSTANT, SUBTRACTED STORE LOCATION OF AVAILABILITY WORD FIRST, UNFIXED, OTHER, FIXED, NON-ZERO, SUBTRACT 90	2572
0653 90 0329 0521	4103		90 X1	X0004	. 0007	FIRST ONFIXED OTHER FIXED	702
0654 11 1308 0963						NON-ZERO. SUBTRACT 90	1474
0655 15 0959 1020			15 BP1	SAI		RESTORE AND MODIFY	1690
0656 93 0660 1061			93 XAS			D. IT IS AN INDEXING OPERATION	1810
0657 69 0310 0042		C NO	69	SUB19		NON-ZERO. SUBTRACT 90 RESTORE AND MODIFY D, IT IS AN INDEXING OPERATION STARTED WITH L, OR NOT FIRST, PROC. L D, ADDR IS ODD. EQUIV IN RIGHT END INDEXING OP, FORWARD I, BACKWARD L. STORE EXIT OOUBLE IT D, DRUM. I, CORE.	582
0659 44 1063 0314			44	LH		D. ADDR IS ODD. EQUIV IN RIGHT END	1544
0660 60 0184 0939		N XAS	60 P0008			INDEXING OP FORWARD I . BACKWARD L.	1832
0661 24 0179 0432	0179	N SUBR7	24 EXITZ		EXITZ	STORE EXIT	1328
0662 15 8002 1221			15 8002	PC		D. DRUM. I. COPE.	2046
0663 46 0366 0467 0664 10 0153 0714			46 10 R0003	KC		ALDHADETIC I	2206
0665 45 0668 1219			45	NG		I. REGION IS UNDEFINED	1488
0666 44 1326 1078		J	44 NGD			1 • REGION IS UNDEFINEO D • RELOCATED O IS EXCESSIVE	2270
0667 11 8003 0975		_	11 8003				
0668 15 0536 0691			15 EOUIV	RC NG		GET EQUIVALENT OF REGIONAL ADDRESS)	1490
0669 16 0515 0719			16 110TH			MODIFY TO END WITH 1999)	1054
0670 44 1073 0674			44 IPOS			O. USE I-POSITION. I. USE D-POSITION.	1350
0671 46 0324 0225			46	TP		O, NOT LAST LINE.	1022
0672 00 0000 0800		K BBTHX	00 0000	0800			2662
0673 65 0167 0621		J	65 XXXX1			BRING BACK A SET OF RESUTTS)	912
0674 65 0536 0541			65 EQUIV	10000		BRING EOUIVALENT	1352
0675 00 0990 0368 0676 10 0409 0713		J	00 0990	J0001 RES		TAGS AND EXIT FOR SUBROUTINE 11	1316 1392
0677 24 0178 1281	0178	N INDEX	10 2000I 24 EXITY	KES	EXITY	RESTORE RELOCATED DRUM ADDRESS STORE EXIT	2032
0678 44 1081 0682	0110	II THUEN	44 YES		EAT I	I. D IS NOT TRUE ADDRESS	1974
0679 65 8001 0535		N OUT	65 8001			THEY ARE DIGITS. GET VALUE)	1464
0680 60 0153 0962		551	60 R0003			ALPHABETIC I TO UPPER	2180
0681 11 0334 0539			11 9060			SUBTRACT 9060	1398
0682 60 1235 1089			60 8	AX		MORE TAGS INTO UPPER	1976
0683 66 8002 0491		J	66 8002			CHANGE SIGN OF CORRECTION	1258
							2/02
0684 15 1119 0734			15 29IXX			ADD 29	2482
0685 10 8001 1291			15 29IXX 10 8001			AVAILABILITY WORD BACK INTO UPPER	1724
0685 10 8001 1291 0686 66 0038 0643		N SHRT	15 291XX 10 8001 66 16THX			AVAILABILITY WORD BACK INTO UPPER SHORT. PRESET T AS -1)	1724 1510
0685 10 8001 1291 0686 66 0038 0643 0687 00 0000 0991		N SHRT J F	15 29IXX 10 8001 66 16THX 00 0000			AVAILABILITY WORD BACK INTO UPPER SHORT. PRESET T AS ~1) TO BUILO EXIT FROM SUBROUTINE 13	1724 1510 1622
0685 10 8001 1291 0686 66 0038 0643		N SHRT	15 291XX 10 8001 66 16THX			AVAILABILITY WORD BACK INTO UPPER SHORT. PRESET T AS -1)	1724 1510

0689 60 8003 0057			60 8003	SB10A		CLEAR LOWER	1586
0690 69 0794 1025			69	SUBZR		RESERVE 0000	2430
0691 16 0515 1269			16 110TH			GET EQUIVALENT OF REGIONAL ACORESS)	1492
0692 24 0743 0396	0743		24 SW		SW	GOING BACKWARO. SET SWITCH OFF) ALL CASES. GOING WHICH OIRECTION	1660
0693 69 0178 0981 0694 60 8001 0709		C SSW	69 EXITY 60 8001	SUB10		PUNCH A CARO, AND REPEAT RBO	1630 2408
0695 00 0500 0500		к сз	00 0500	0500		TO MODIFY IDENTIFICATION	2610
0696 65 0153 0746			65 R0003			ALPHARETIC I	2628
0697 24 1050 1103	1050		24 1050		1050	CHANGE FIRST-CARO TAG)	1186
0698 66 0515 0178			66 110TH	EXITY		IF 8001 CORRECTION IS -1 L-0 AOOENOS TO LEFT ENO LOWER)	2018 1788
0699 35 0001 1055 0700 24 0187 0285	0187	o os	35 0001 24 P0011	x	P0011	E-0 MODENOS TO LET I ENO COMER 7	942
0701 45 0655 0705	0101	0 00	45	FULL	. 0011	I. THERE IS NO AVAILABLE LOCATION.	1688
0702 00 0001 0001		P C6	00 0001	0001		TO MODIFY VARIABLE BRINGING OROER	2602
0703 90 0187 0528		N ADC	90 X2	X0011		NO, FIXEO. YES, UNFIXEO.	726
0704 35 0006 0770 0705 01 0222 1109		N ABS N FULL	35 0006 01 0222			ABSOLUTE AOORESS OR EOUIVALENT STOP RECAUSE ORUM IS PACKEO	1560 1698
0706 69 0095 0548		N TOLL	69 OPTIM			OPTIMIZING TAGS	1826
0707 69 1030 0383			69 1030			IF SO, WHERE OIO SEARCH START	608
0708 30 0009 0108		P C2	30 0009	SA		PRESETTER AND ALSO COMPARISON CONSTANT	1126
0709 15 1044 0499 0710 35 0002 0785		C SUB10	15 81 STX 35 0002	SEO		C.I. TO PUNCH X-9) OTHER. I-AOOENOS TO LEFT ENO LOWER	1582 1804
0711 65 0536 0921		J PRE	65 EOUIV	C0004		BRING EQUIVALENT. MULTIBRANCH	1228
0712 69 1015 0063		_	69 PRE	SUBR9		ANALYZE L-AOORESS	2072
0713 21 0167 0720	0167	C RES	21 XXXX1		XXXXI	STORE AOORESS TEMPORARILY	1404
0714 69 1117 1024			69	SUBR8		PROCESS I	, 2288
0715 15 0718 8002 0716 61 8003 0780			15 61 8003	8002		MAKE BRINGING OROER CHANGE ITS SIGN	1540 2396
0717 60 8003 1225			60 8003			CLEAR LOWER	1730
0718 69 1555 0659		J	69 E0001			BRING WORD SHOWING EOUIVALENT	1542
0719 20 1003 0411	1003		20 N	OK	N	MOOIFY TO ENO WITH 1999)	1056
0720 69 1273 1025 0721 30 0004 1319			69 30 0004	SUB2R LR		RESERVE IF ORUM AOORESS EOUIVALENT IN I POSITION OF LOWER	1406 1550
0722 00 0000 0080		K 89THX	00 0000	0080		LOGIVALENT IN 1 POSITION OF LOWER	2658
0723 10 0326 0281			10 W			REPLACE OIGIT OF AVAIL. WORD BY W)	1004
0724 46 0416 0328			46 SYM			O, FIRST IS SPEC. CHAR. SYMBOLIC	1480
0725 45 0278 0679 0727 00 0000 0631			45	OUT		ARE LAST FOUR CHARACTERS OIGITS) AOOEND AND EXIT FOR SUBROUTINE 18	1454
0728 65 1023 0421		3	00 0000 65 BLANK	L0004		USE PROPER VALUE FOR BLANK AOORESS	1264 2084
0729 84 1200 0775			84 1200	20004		SEARCH TABLE ACCORDING TO SIZE OF AOOR	1564
0730 21 0158 1314	0158		21 R0008		R0008	STORE AOVANCEO O AOORESS	2392
0731 15 0384 8002			15 T	8002		AOVANCE LOWER AND BRING ANOTHER	1432
0732 10 8001 0999 0734 46 0029 0940		N ORM	10 8001 46 0029	Α		ORUM. MAKE POSITIVE AGAIN IF SPEC CHAR, TO BLR DIRECTLY	2058 2484
0735 97 0688 0490			97 FO	FIBO		O, FORWARO O. I, BACKWARO O.	1782
0736 65 8003 0693			65 8003	SSW		CLEAR ACCUMULATOR AND JUMP	1616
0737 65 0346 0551		J OFF	65 AI	SWOF		HAVE WE REACHED TOP OF TABLE	1648
0738 65 1342 0611		J OFB	65	SUB11		FINO AN EOUIVALENT	2098
0739 65 0346 0601 0740 24 0179 1282	0179	N SUB	65 AI 24 EXITZ		FX1T7	START BACKWAROS SEARCH. HOW FAR STORE EXIT	1670 2458
0741 24 0384 0587	0384	11 300	24 T		T	PRESET T AS POSITIVE 1)	1504
0742 65 0197 1051		N BL	65 ALOPT			BACKWARO L. GET ALOPT	1806
0743 65 0346 0551		SW	65 AI	SWOF		NOT PERFORMEO-JUST FOR OPTIMIZING	1646
0744 11 8001 0452 0745 15 0695 1349			11 8001 15 C3			OUPLICATE INTO AVAILABILITY TABLE) MOOIFY IDENTIFICATION OF WORD	2412 2566
0746 45 0796 0946			45	sco		JUMP IF I IS BLANK	2630
0747 69 0108 8002			69 HSYMB	8002		STORE SYMBOL)	1334
0748 94 0800 0912			94 0800			IF BLANK O AND MOF, STOP MACHINE	2130
0749 92 0402 1105 0750 21 0304 0458	0304	R XX	92 SHOP 21 UH		UH	O. IT IS A SHIFT OPERATION REPLACE OIGIT OF AVAIL. WORD BY W)	1800 998
0751 69 0955 1209	0304	1 44	69 STR		011	NEW AVAILABILITY WORD INTO ORUM)	1734
0752 10 1245 0952			10 05			RESTORE VARIABLE BRINGING OROER	2596
0753 69 0356 0305		J	69	SUBR4		PROCESS L BACKWAROS FROM O	814
0754 20 0435 0638 0755 65 0346 0951	0435	C SKP	20 LSYMB		LSYMB	AOORESS OF SYMBOL RELATIVE TO START ALL CASES. WHAT OID WE RESERVE)	1534 1740
0756 35 0004 0767		C JKF	65 AI 35 0004			SHIFT AODENOS TO LEFT ENO	1844
0757 69 0360 0013			69 BRNG			BRING BACK A SET 1	636
0758 30 0000 0108		P C7	30 0000	SA		PRESETTER FOR START OF NEW COLUMN	1140
0759 21 0186 0177	0186		21 P0010	EXITX	P0010	FROM 4-6.19-21. TO SUPPRESS)	1600
0760 30 0005 0974 0761 00 0988 0918			30 0005	C0001		ISOLATE LAST OIGIT OF O-AOORESS)	1820
		J	00 0988 69 PRE	C0001 SUBR9		TAGS AND EXIT FOR SUBROUTINE 11 ANALYZE O-AOORESS	12 4 2 2120
0763 44 0517 0618			44 NZ	000>		ANALYZE O-AOORESS O, IT WAS NOT RIGHT ONE	2120 1424
0764 69 1217 0063		C BOTH	69	SUBR9		ANALYZE I	2316
0765 60 1555 1088 0766 16 0930 1339		Q 800	60 A0201 16 94I	TA		IS THIS ANOTHER RBO CARO)	1772 2404
0767 92 0785 1222			92 SEO			JUMP UNLESS OPERATION 80.82. OR 88	1846
0768 00 0889 0572		J	00 0889	10001		TAGS AND EXIT FOR SUBROUTINE 11	2202
0769 30 0010 0108 0770 16 8002 0729		0 C5	30 0010	SA		TO RESTORE AFTER SUBTRACTING C2	1136
0770 16 8002 0729			16 8002 35 0002			ADORESS INTO LEFT ENO DISTRIBUTOR 000. SEPARATE LAST ADDENO.	1562 1894
0772 90 0626 0369			90	J0002		O, ORUM IS NOT FULL	1304
0773 21 0228 0481	0228		21 P		Р	MAKE SEVERAL VARIABLE OROERS)	1070
0774 00 0000 0004		K 41XXX	00 0000	0004		HAVE -DINCING ODDED	2648
0775 15 0378 8002 0776 23 0536 0704	0536		15 23 EOUIV	8002 ABS	EQUIV	MAKE BRINGING OROER STORE EOUIVALENT OF SYMBOL	1566 1554
0777 11 0409 0663			11 20001			SUBTRACT 2000	1384
0778 00 0808 0782		J	00 0808			TAGS AND EXIT FOR USE IN SUBR 11	2146
0779 20 0738 0936 0780 46 1329 0094	0733		20 B	6001	В	SHOULO WE INTERCHANGE ACCENOS)	1860
0780 46 1329 0094			46 OUT 44	0094 SHRT		O, WE HAVE FINISHEO O, LONG SYMBOL	2 3 98 1500
				J			1550

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PERHAPS MOOIFY OYNAMIC LEVEL )
0-POSITION HOLOS 0 FOR 0, 1 FOR I )
AOORES OF 0001 OF REGION
0782 69 1086 0586
0783 30 0004 1093
                                               69
                                                               SUB17
                                               30
                                                      0004
                                                                                                                                                  2038
0784
     69
          0158
                8002
                                               69 R0008
                                                                   8002
                                                                                                                                                  2490
                                                                                   AOORES OF OOO1 OF REGION
ALL CASES. WHICH DIRECTION
GOING BACKWARO. SET SWITCH OFF;
O, FORWARO I. I, BACKWARO L.
FINO DYNAMIC LEVEL
ISOLATE LAST DIGIT OF 0-AOORESS;
SUBTRACT 90
0785 69
         0179 0582
                                C SEO
                                               69
                                                  EXITZ
0786 69
0787 97
         0739 0692
                                N BAK
                                               69
                                                  OFR
                                                                                                                                                  1658
                                   9
                                               97
          0490
                0742
                                                  FIBO
                                                                                                                                                  1784
0788
          1243
               0441
                                                               SUB13
                                                                                                                                                   2158
0789
                                                  0009
99THX
      35
         0009
               0760
                                               35
0790
                1216
          1308
                                               16
                                                                                   SUBTRACT 90
STOP IF SYMBOL TABLE IS FULL
STORE COMPARISON CONSTANT
PUNCH CARO AND PROCEED
MODIFY IDENTIFICATION OF WORD
BRING NUMERICAL I
MAKE RRINGING ORDER )
STORE OYNAMIC LEVEL FOR REFERENCE
0791 01
         0111
                1219
                                 J FULL
                                              01
                                                     0111
                                                               NG
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                                              20 A0
60 R0010
0793
                        1097
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                0709
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0795
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      15
                                              65 R0009
15 P1
0796 65
         0159 0946
                                                               SCO
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0797
      15
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         1000
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0798
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                1049
                        0292
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                                                               В
                                                                            ORCEQ
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                                                                                   O-ADDRESS TO LEFT ENO OF DISTR )
FOR OPERATION = LOCATION - 0800
FOR OPERATION = LOCATION - 0800
0799
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0801
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         0404
                9998
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                                                      2322
                                                                                   FOR OPERATION = LOCATION - 0800
FOR OPERATION = LOCATION - 0800
0802
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                8998
0803 00
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0804
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0805 00 0505
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0806 00
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0807
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0808
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0810 33
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0812
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0813 99
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0814 33
0815 33
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OPERATION
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0816
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0818 33
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0819
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0820 54
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0821 45
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0822
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0823 3W
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0824 33
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0825 4
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0826 00 0505
0827 00 0505
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0828
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0829
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OPERATION
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0830 00
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0831 00 0000
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0834 33
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0835 00
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0836 00
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OPERATION
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0837
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0838
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0839
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0840 33 0404
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0841 33
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0842
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0843 33
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0844
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0845 43
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         0504
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0846 33
0847 33
                                                                                   FOR OPERATION
         0404
                9998
                                       0846
                                               33
                                                      0404
                                                                   9998
                                                                                                       LOCATION
                                                                                                                     0800
                                                                                                                                                    202
         0505
                9998
                                                                   9998
                                                                                                       LOCATION
                                       0847
                                               33
                                                      0505
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                                                                                                                                                    204
                                       0848
                                               33
                                                                                                       LOCATION
                                                                                                                                                    206
0848
     33
          0404
                9998
                                                      0404
                                                                   9998
                                                                                   FOR
                                                                                        OPERATION
                                                                                                                     0800
                                                                                        OPERATION
                                                                                                       LOCATION
0849
          0404
                9998
                                       0849
                                                      0404
                                                                   9998
                                                                                   FOR
                                                                                                                     0800
                                               33
                                                                                                                                                    208
0850 00 0000
                9898
                                       0850
                                              0.0
                                                      0000
                                                                   9898
                                                                                   FOR
                                                                                        OPERATION
OPERATION
                                                                                                       LOCATION
                                                                                                                   - 0800
                                                                                                                                                    210
                                                                                                       LOCATION
0851 00
         0000
                9898
                                                                   9898
                                                                                   FOR
                                                                                                                     0800
                                       0851
                                              00
                                                                                                                                                    212
0852 00
                9898
                                       0852
                                                      0000
                                                                                   FOR OPERATION
                                                                                                       LOCATION
          0000
                                              00
                                                                   9898
                                                                                                                     0800
                                                                                                                                                    214
0853 00
         0000
                9898
                                       0853
                                              00
                                                      0000
                                                                   9898
                                                                                   FOR
                                                                                        OPERATION
OPERATION
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                                                                                                                     0800
                                                                                                                                                    216
0854 44
         0505
                9999
                                       0854
                                               44
                                                      0505
                                                                   9999
                                                                                   FOR
                                                                                                                     0800
                                                                                                                                                    218
0855 00
         0505
                8998
                                       0855
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                                                                   8998
                                                                                   FOR
                                                                                        OPERATION
                                                                                                       LOCATION
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                8998
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                                                                   8998
                                                                                   FOR
                                                                                        OPERATION
                                                                                                       LOCATION
                                                                                                                     0800
                                                                                                                                                    222
0856 00
         0505
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0857 00
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                8998
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0858 00
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                9898
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                                                                                                       LOCATION
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                                       0858
                                               00
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LOCATION
          0000
                9898
                                                      0000
                                                                                   FOR
                                                                                        OPERATION
                                                                                                                     0800
                                                                                                                                                    228
                                                                                        OPERATION
                                                                                                                                                    230
0860 33
         0504
                9999
                                       0860
                                               33
                                                      0504
                                                                   9999
                                                                                   FOR
                                                                                                                     0800
                9999
                                                      0504
                                                                                        OPERATION
                                                                                                       LOCATION
                                                                                                                                                    232
0861
         0504
                                       0861
                                               33
                                                                   9999
                                                                                   FOR
                                                                                                                     0800
     33
                                                                                   FOR
     99
         9999
                8999
                                       0862
                                                       9999
                                                                   8999
                                                                                        OPERATION
                                                                                                       LOCATION
                                                                                                                     0800
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0862
                                                                                                       LOCATION -
0863 99 9999
                8999
                                       0863
                                               99
                                                      9999
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                                                                                   FOR
                                                                                        OPERATION
                                                                                                                     0800
                                                                                                                                                    236
                                                                                        OPERATION
                                                                                                       LOCATION
                                                                                                                                                    238
                                                                                   FOR
                                                                                                                     0800
0864 33 1110
                8999
                                       0864
                                               33
                                                      1110
                                                                   8999
                                                                                        OPERATION
                                                                                                       LOCATION
0865 33
                9999
                                       0865
                                                      0504
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                                                                                                                                                    240
          0504
                                               33
0866 33
0867 33
          0504
                9999
                                       0866
                                                      0504
                                                                   9999
                                                                                   FOR
                                                                                        OPERATION
                                                                                                       LOCATION -
                                                                                                                     0800
                                                                                                                                                    242
                                                      0504
                                                                                        OPERATION
                                                                                                                                                    244
         0504
                9999
                                       0867
                                               33
                                                                   9999
                                                                                   FOR
                                                                                                                     0800
                                       0868
                                                                                   FOR
                                                                                        OPERATION
                                                                                                       LOCATION
                                                                                                                                                    246
0868 33
         0504
                9999
                                                      0504
                                                                   9999
                                                                                                                     0800
                                               33
                                                                                        OPERATION
OPERATION
                                                                                                       LOCATION
                                                                                                                                                    248
250
                                                                   9999
                                                                                                                     0800
0869 33
0870 00
                                       0869
         0303
                                               33
                                                      0303
                8999
                                                                   8999
                                                                                   FOR
0871 00
         0504
                8999
                                       0871
                                               00
                                                      0504
                                                                   8999
                                                                                        OPERATION
                                                                                                       LOCATION
                                                                                                                     0800
0872 00 0504
                8999
                                       0872
                                               00
                                                      0504
                                                                   8999
                                                                                   FOR OPERATION
                                                                                                    =
                                                                                                       LOCATION - 0800
                                                                                                                                                    254
0873 00 0504
                                                                   8999
                                                                                   FOR OPERATION =
                                                                                                       LOCATION - 0800
                                                                                                                                                    256
                8999
                                       0873
                                               00
                                                      0504
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				2000		FOR OPERATION = LOCATION - 0800	252
0874 00 0504 8999 0875 00 0504 8999		K 0874 K 0875	00 0504 00 0504	8999 89 9 9		FOR OPERATION = LOCATION - 0800	258 2 60
0876 00 0504 8999		K 0876	00 0504	8999		FOR OPERATION = LOCATION - 0800	262
0877 00 0504 8999 0878 00 0504 8999		K 0877 K 0878	00 0504 00 0504	8999 8999		FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 0800	264 266
0879 00 0505 9999		K 0879	00 0505	9999		FOR OPERATION = LOCATION - 0800	268
0880 01 0100 9898		K 0880	01 0100	9898		FOR OPERATION = LOCATION - 0800	270
0881 00 0000 9898 0882 01 0100 9898		K 0881 K 0882	00 0000 01 0100	9898 9898		FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 0800	272 274
0883 00 0000 9898		K 0883	00 0000	9898		FOR OPERATION = LOCATION - 0800	276
0884 33 2526 8999		K 0884	33 2526	8999		FOR OPERATION = LOCATION - 0800	278
0885 00 0606 8998 0886 00 0606 8998		K 0885 K 0886	00 0606 00 0606	8998 8998		FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 0800	280 282
0887 00 0606 8998		K 0887	00 0606	8998		FOR OPERATION = LOCATION - 0800	284
0888 01 0100 9898		K 0888 K 0889	01 0100 00 0000	9898 9898		FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 0800	286 288
0889 00 0000 9898 0890 40 0505 9998		K 0890	44 0505	9998		FOR OPERATION = LOCATION - 0800	290
0891 33 0505 9998		K 0891	33 0505	9998		FOR OPERATION = LOCATION - 0800	292
0892 33 0505 9998 0893 33 0505 9998		K 0892 K 0893	33 0505 33 0505	9998 9998		FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 0800	294 296
0894 33 0505 9998		K 0894	33 0505	9998		FOR OPERATION = LOCATION - 0800	298
0895 33 0505 9998 0896 33 0505 9998		K 0895 K 0896	33 0505 33 0505	9998 9998		FOR OPERATION = LOCATION - 0800 FOR OPERATION = LOCATION - 0800	300 302
0897 33 0505 9998		K 0897	33 0505	9998		FOR OPERATION = LOCATION - 0800	304
0898 33 0505 9998		K 0898	33 0505	9998		FOR OPERATION = LOCATION - 0800	306
0899 4# 0505 9998 0900 65 1003 0508		K 0899 R 0900	44 0505 65 N	9998		FOR OPERATION = LOCATION - 0800 HAVE WE FINISHED	308 1010
0904 35 0004 0715			35 0004			OUOTIENT INTO D OF LOWER	1538
0905 35 0001 1011 0907 16 0410 0315			35 0001 16 OF			RESERVE) IS THIS LAST SET)	1716 664
0908 65 0536 0271		J PRE	65 EOUIV	M0004		EOUIVALENT TO LOWER. MULTIBRANCH	1178
0909 15 8002 0693 0910 84 1300 1275			15 8002	SSW		4 TIMES DYNAMIC ADDRESS IN D POSITION	1628
0910 84 1300 1275		J PRE	84 1300 65 EOUIV	J0004		BRING EOUIVALENT. MULTIBRANCH	1838 1296
0912 65 1115 0611			65	SUB11		SLANK D. BUT NOT MOF. FINO VALUE OF O	2132
0913 46 0416 0567 0914 69 1267 0063			46 SYM 69	LOO SUBR9		D, ADDRESS IS SYMBOLIC. ANALYZE D	1450 2336
0915 60 1354 1088		0 599	60 A0000	TA		AIREIZE V	1762
0916 24 1555 0000	1555	0 0	24 A0201	0000 P	A0201	INTERCHANGE AND MAKE NEGATIVE)	2434
0917 16 0733 0935 0918 20 1023 0376	1023	N C0001	16 B 20 BLANK	Ā	BLANK	STORE EQUIV OF BLANK FOR FORWARD L	1880 1230
0919 60 0672 0627		R C0002	60 88THX	5810B		N G. OMIT PUNCHING	1232
0920 69 1050 1353 0921 69 0624 0677		R C0003 N C0004	69 1050 69	INDEX		BLANK AOORESS. WAS THERE BLANK BACK L DRUM OR EOUIVALENT. INDEX IF TAGGED	1234 1244
0922 65 0625 0611		R C0005	65	SU811		NEW SYMBOL. FIND BEST EQUIVALENT	1248
0923 69 0426 0441 0924 69 0727 0677		R C0006	69	SU813		800X AODRESS. GET OYNAMIC LEVEL	1252
0925 20 0184 0177	0184	R C0007 R C0008	69 20 P0008	INDEX	P0008	CORE ADDRESS. INOEX IT MISC ADDR. STORE FOR PUNCHING. EXIT	1262 1280
0926 69 0711 0661		N C0009	69 PRE	SU8R7		STORE EQUIVALENT OF NEW SYMBOL	1282
0927 00 0000 0919 0928 00 0000 0932		R C0010 J	00 0000	C0002		NEW SYMBOL, 8UT TABLE FULL. N.G. AODEND AND EXIT FOR SUBROUTINE 18	1284 2154
0929 46 0732 0933			46 DRM			I + CORE D + ORUM .	2052
0930 00 0000 0094 0931 96 0484 0736		K 94I	00 0000 96 DI	0094		I . ADORESS IS BACKWARO I OR FORWARD L	2436 1614
0932 20 0184 0788	0184		20 P0008		P0008	STORE THE CORE ADDRESS FOR PUNCHING	2156
0933 11 8003 1242			11 8003	222		CORE. CLEAR UPPER	2054
0934 15 1090 8002 0935 20 0167 1320	0167	СР	15 K 20 XXXX1	8002	XXXX1	MAKE STORING OROER, AND STORE ZERO ALL CASES. STORE ADDENOS	2510 1884
0936 60 8003 0943			60 8003			SHOULO WE INTERCHANGE ADDENDS)	1862
0937 20 0792 0495 0938 69 1293 0441	0792		20 INO 69	SU813	IND	BACKWARD. SHOULD WE INTERCHANGE ADONO FIND DYNAMIC LEVEL	1854 2220
0939 30 0004 0799			30 0004	30013		D-AODRESS TO LEFT ENO OF OISTR)	1834
0940 35 0004 0552	0.54		35 0004			SHIFT TO 0 POSITION	2486
0941 21 0154 0759 0942 16 0545 1085	0154		21 R0004 16 COUNT	СР	K0004	TO SUPPRESS IN CASE WE SEARCH IF 8ACKWARO L. SUBTRACT TAG-COUNT)	1598 1912
0943 30 0002 0949			30 0002			SHOULO WE INTERCHANGE ADDENDS)	1864
0944 65 0152 1318 0945 10 0702 8003		J	65 R0002 10 C6	8003		ALPHARETIC SYMBOL MOOIFY 8RINGING OROER, AND BRING	2534 2576
0946 20 0726 0001	0726	C SCD	20 COIFF	SETCC	COIFF	STORE CORE RELOCATION AMOUNT	2634
0947 11 8001 0604 0948 91 0177 0335			11 8001 91 EXITX	SB10C		CLEAR FIRST LETTER 0, 8RANCH	1446 2168
0949 20 0906 1010	0906		20 A	35100	Α	SHOULD WE INTERCHANGE ADDENDS)	1866
0950 90 0271 0505 0951 16 1354 1309			90 M0004			D, CASE WHERE WE DUPLICATE COMPUTATION WHAT CELL DID WE RESERVE)	1212 1742
0952 16 1295 1249			16 C7	LOOP		MODIFY IDENTIFICATION FOR NEXT CARD	1742 2598
0953 69 0406 0305	0055	J	69	SUBR4	0.00	PROCESS L BACKWARDS FROM I	832
0954 20 0959 0462 0955 21 9972 0755	0959 9 972	J STR	20 BP1 21 9972	SKP	8P1 9972	STORE VARIABLE BRINGING ORDER NEW AVAILABILITY WORD INTO ORUM)	1640 1738
0956 15 0062 1017			15 OPREG		.,,,	ADD OLD DYNAMIC LEVEL	1902
0957 69 0460 0063 0958 69 0711 0063			69 69 PRE	SUBR9 SUBR9		ANALYZE I: FOR TYPE OF ADDRESS ANALYZE THE ALPHABETIC D ADDRESS	692
0960 35 0008 0779			35 0008	30089		SHOULD WE INTERCHANGE ADDENDS)	1226 1858
0961 30 0008 0629			30 0008	61105		ALSO STORE FIRST LETTER OF ADDRESS)	1442
0962 69 1215 0063 0963 46 0466 0416			69 46	SUBR9 SYM		ANALYZE I-ADDRESS I, FIRST CHAR IS DIGIT. ADDR SYMBOLIC	2182 1476
0964 16 0409 1064			16 2000I			CORE OR DRUM	2364
0965 30 0005 0628 0966 16 1230 8002			30 0005 16	8002		I TAG TO RIGHT END LOWER DUPLICATE INTO AVAILABILITY TABLE)	1944 2422
0967 14 1022 1060			14 2IXXX			WHICH ONE DO WE USE)	1888
0968 15 0726 1082 0969 60 8002 0777			15 CDIFF	CD		ADD CORE RELOCATION AMOUNT	2368
0,00,00 8002 0717			60 8002			NUMERIC ADDRESS ALONE IN UPPER	1382

0970 30 0006 1069 0971 35 0001 0678			30 0006 35 0001	DDN		SHIFT TO REMOVE TABULAR ADDRESS) ONE DIGIT INTO UPPER	1572 1972
0972 16 0290 0445		N DEF	35 0001 16 Y			DEFINED SYMBOL. SUBTRACT Y	1530
0973 69 0246 0299		N DEI	69 C1			MODIFY TO TAKE NEXT COLUMN OF TABLE')	1102
0974 10 1277 8003			10	8003		MAKE BRINGING ORDER	1822
0975 35 0004 0685			35 0004			MOVE AMDUNT OF SHIFT INTO D	1722
0976 20 0178 0931	0178		20 EXITY		EXITY	STDRE EXIT DUT OF LOWER	1612
0977 60 0622 0177		N BAD	60 87THX	EXITX		MODIFIED ADDR TOD HIGH. 8000 TO UPPER	1412
0978 65 1023 0579			65 8LANK	10008		MAKE BLANK I EQUAL TO BLANK D	2198
0979 00 0889 0580		J	00 0889	10009		TAGS AND EXIT FOR SUBR 11.	2210
0980 46 1283 0634			46 DDNE	0.4.4		DUPLICATE INTO AVAILABILITY TABLE) D. FORWARD. I. BACKWARD.	2416
0981 97 0534 0786 0982 00 0000 1336		1	97 00 0000	BAK			1632 2274
0983 90 1001 0738		3	90 MDFLL			ADDEND AND EXIT FOR INDEXING D. START SEARCH. I. WE ARE DN DUITT	2096
0984 24 1030 1084	1030		24 1030		1020	TAG IN CASE L IS UNDEFINED SYMBOL)	2524
0985 30 0008 0956	1050	С ВОТН	30 0008		1030	8DTH. RIGHT ADDEND TO RIGHT END	1900
0986 16 8001 0993		C 00111	16 8001			CLEAR DP FROM ACCUMULATOR	1936
0987 15 0132 1037			15 12NDX			SHOULD WE INTERCHANGE ADDENDS)	1870
0988 69 0177 0661			/ O EVITY	SUBR7		CIDDE CYMOOL AND THE FOULTVALENT	2230
0989 65 0155 1210			65 R0005			AND TAGS AND OPERATION ADD A SYMBOL TO UPPER 4 TIMES DYNAMIC ADDRESS IN D PDSITION STORE THE ADDRESS FOR PUNCHING D TAG INTO UPPER PUNCH PUNCH POLICE PRINCING DRDER, AND BRING	1930
0990 10 1898 0608		J	10 ZMAXM	U0001		ADD A SYMBOL TO UPPER	2500
0991 35 0004 0501			35 0004			4 TIMES DYNAMIC ADDRESS IN D POSITION	1624
0992 24 0184 1287	0184		24 P0008		P0008	STORE THE ADDRESS FOR PUNCHING	2006
0993 35 0005 1006			35 0005			D TAG INTO UPPER	1938
0994 60 0003 0057 0995 10 0702 8003			60 READC	SBIOA		PUNCH AND SOLING PROFES AND SOLING	2544
0997 35 0001 0567			10 00	8003		MODILY BRINGING ORDERS AND BRING	2580
0998 20 0292 0177	0292			8003 LDD EXITX	ORCED	ARE LAST FOUR CHARACTERS DIGITS) STORE DYNAMIC LEVEL FOR REFERENCE	1462 2224
0999 15 0167 0178	0274	C A	15 XXXXI	EXITY	UNCLU	ADD ADDRESS BEING INDEXED. EXIT.	2060
1000 69 1555 8003		P P1	15 XXXX1 69 E0001	8003		INITIAL OF BRINGING ORDER	1364
1001 69 1004 0107		N MOFLL	69 L	A		STARTED WITH NEW-SYMBOL L	
1002 44 1005 0606		C LOOP	69 L 44	UND		I. SYMBDL IS NOT IN THE TABLE	1420
1004 90 0090 0000		KL	44 90 0090	EXITY 8003 A UND 0000		STARTED WITH NEW-SYMBOL L I, SYMBOL IS NOT IN THE TABLE TAG, SEARCH STARTED BY NEW-SYMBOL L SOME SYMBOL WAS FOUND. SUBTRACT DURS	524
1005 11 0108 0763							
1006 21 0902 1056	0902		21 0902			STORE D TAG	1940
1007 65 0160 0165			65 R0010	A MAX		IS IT TYPE 08)	494
1008 65 1679 0376			65 8LANB	Α		BRING EDUIVALENT OF BLANK BACKWARD L	1238
1009 45 0512 1113 1010 15 0733 0987			45	MAX		I WE HAVE REACHED TOP OF TABLE	1652
1010 19 0733 0987			15 B 30 0001			SHOULD WE INTERCHANGE ADDENDS) RESERVE)	1868
1012 44 1265 0616			30 0001 44 DN8			D. D IS NOT BLANK.	1718 2192
1013 35 0008 0781			35 0008			CLEAR ALL BUT LAST CHARACTER	1498
1014 65 0167 0771			65 XXXX1			DDD. SEPARATE LAST ADDEND)	1892
1015 65 0536 0421		J PRE	65 EOUIV	L0004		BRING EDUIVALENT. MULTIBRANCH	2074
1016 45 1330 1332			45	BL		I . I IS UNPUNCHED	2462
1017 15 0320 1325			15 50IXX			ADD 50 TD MAKE SURELY POSITIVE	1904
1018 60 0153 1214		J	60 R0003			IS THE I-ADDRESS BLANK	2384
1020 20 0346 8001	0346	C SAI	20 AI	8001	ΑI	STORE BRINGING ORDER, AND DO IT	1656
1021 16 8002 1079			16 8002 00 0000			WHAT CELL DID WE RESERVE)	1748
1022 00 0000 0002		K 2IXXX	00 0000	0002			2646
1024 24 0177 0380	0177	N SUBR8	24 EXITX			STORE EXIT	1374
1025 2 0178 0381	0178	N SU82R	24 EXITY	F-0	EXIII	ENTRY TO RESERVE. STORE EXIT. EVEN. PUT 8003 AT RIGHT END OF LOWER	1030
1026 65 1229 1033 1027 20 0181 0434	01.01	N EVN	65 8003 20 P0005	EO	00005	ADVANCE CARD NUMBER)	2002 1592
1028 00 0001 0577	0181	j	00 0001	10006	F0005	ADDENDS AND EXIT FOR USE IN SUBR 18.	2206
1029 35 0004 1039		3	35 0004	10000		ADDENDS AND EXIT FOR USE IN SUBR 18. LOCATION OF EQUIVALENT RELATIVE TO E1 STORE THIS ADDRESS IN EDUIV ADDEND AND EXIT FOR INDEXING 8DTH. SUBTRACT THE BOOX ADDRESS	1342
1031 20 0536 0178	0536		20 EOUIV	FXITY	FOUTV	STORE THIS ADDRESS IN FOULV	1760
1032 00 0001 1288	-225	J	00 0001			ADDEND AND EXIT FOR INDEXING	2294
1033 16 0536 0992		C ED	16 EDUIV			8DTH. SUSTRACT THE 800X ADDRESS	2004
1034 16 0038 0744		Α	16 16THX			DUPLICATE INTO AVAILABILITY TABLE)	2410
1035 15 8001 1341			15 8001		OLD	WHAT CELL DID WE RESERVE)	1752
1036 21 1091 1094	1091		21 DL0		OLD	SAVE DYNAMIC LEVEL DF L FRDM 0)	822
1037 14 0540 1048			14 42NO			SHOULD WE INTERCHANGE ADDENDS)	1872
1038 16 1091 0245 1039 20 0294 0797	0206		16 OLD		YY -	WHICH L IS LESS, MEASURED DN CIRCLE) LDCATION OF EDUIVALENT RELATIVE TO E1 CLEAR ALL EXCEPT LAST CHARACTER) RESTORE FIRST CARD TAG)	840 1344
1039 20 0294 0797	0294		20 XXXX2 30 0008		^^*	CLEAR ALL EXCEPT LAST CHARACTER 1	2506
1041 69 1044 1047			30 0008 69 81STX			RESTORE FIRST CARD TAG 1	366
1042 65 0515 0178			65 110TH	EXITY		UNIT CORRECTION TO DYNAMIC LEVEL	2010
1043 00 0000 8001		K 8001	00 0000	8001			2022
1044 80 0000 0000		K 81STX	80 0000	0000			2676
1045 10 0702 8003			10 C6	8003		MDDIFY BRINGING ORDER, AND BRING	2584
1046 44 0752 0003			44	READC		D. WE ARE NOT DONE.	2594
1047 24 1050 0160	1050		24 1050	R0010	1050	RESTORE FIRST CARD TAG) MULTIBRANCH	368
1048 44 1351 1052			44 DK			I. WE SHOULD INTERCHANGE	1874
1049 69 0095 0948		СВ	69 DPTIM			SEVERAL CASES. WHAT KIND DF DP	2166
1051 92 0402 0656 1052 66 0906 1111			92 SHOP			D, IT IS A SHIFT OPERATION	1808 1876
	0450		66 A		v	INTERCHANGE AND MAKE NEGATIVE)	1064
1053 21 0658 0461 1054 60 1554 1088	0658	D 799	21 X 60 A0200	TA	X	MAKE SEVERAL VARIABLE DRDERS)	1770
1055 16 8002 1313		0 177	16 8002	18		L-D ADDENDS TO LEFT END LOWER)	1770
1056 65 8002 0965			65 8002			OELETE D TAG	1942
1057 69 0510 0063			69	SUBR9		ANALYZE D	716
1058 65 0761 0611		N BB1	65	SU811		GET BLANK D OYNAMICALLY FROM I	1240
1059 45 0612 1213			45	MIN		D. WE ARE NOT BACK TO START YET	1674
1060 44 1014 0414			44	EVN		D. DPREG WAS DDD. I. EVEN.	1890
1061 91 0364 0688			91	FD		D. IT IS A BRANCH DPERATION	1812
1062 90 8002 1067			90 8002			D. WE ARE NOT ON FIRST BACKWARD CARD	2238
1063 67 8001 1319			67 8001 46 D	LR		EOUIVALENT IS IN I POSITION OF LOWER D. DRUM. I. CORE.	1546 2366
1064 46 1317 0968 1065 65 0536 0472		J PRE	65 EOUIV	00004		BRING EDUIVALENT. MULTIBRANCH	2122
1066 16 0158 1332			16 R0008	BL		SUBTRACT NUMERICAL O FROM LOWER	2466

1047 40 0202 0445			69 ORCEQ			STORE ORCEQ FOR USE WHEN WE START FORW	2240
1067 69 D292 0645 1068 6D 0158 1264			6D RDD08			BRING FIRST ADDRESS AGAIN	2388
1069 1D D179 8DD3		C DON	1D EXITZ	8003	C 1.1	FROM MANY PLACES. MULTIBRANCH	1574
107D 24 0743 0446 1071 21 D197 D177	D743 D197		24 SW 21 ALOPT	EXITX	SW ALOPT	AT TOP. SET SWITCH ON) STORE ALL OPTIMIZING TAGS	1680 1982
1072 9D D976 1077			90	PAKT		I , YES.	161D
1073 65 D536 D591 1074 15 8003 1D31		N IPOS	65 EQUIV 15 8003			USE I_POSITION. BRING EQUIVALENT WHAT CELL DID WE RESERVE)	1360 1758
1075 28 D178 0431	D178	N SUB2U	24 EXITY		EXITY	ENTRY TO UNRESERVE. STORE EXIT.	1034
1076 65 1279 1033 1077 15 0515 8DD2		C PAKT	65 80D2	E0 8D02		OOO. PUT 8002 AT RIGHT END OF LOWER MOOIFY EXIT)	2D00 17D6
1077 15 0515 8002 1078 69 0982 0677		CPAKI	15 110TH 69	INDEX		INOEX D	2272
1079 35 0DD1 1035			35 DDD1			WHAT CELL DID WE RESERVE)	1750
108D 65 8DD3 1038 1081 6D D584 1089		N YES	65 80D3 60 9	AX		WHICH L IS LESS, MEASURED ON CIRCLE) MORE TAGS INTO UPPER	838 1978
1082 15 D409 0124		C CD	15 2000I	Q0007		RESTORE THE 200D AND JUMP BACK	2372
1083 10 D186 0494 1084 24 D197 1350	D197		10 POO1D 24 ALOPT		ALOPT	FIX C.I. SO THAT O WILL NOT PUNCH) TAG IN CASE L IS UNDEFINED SYMBOL)	2280 2526
1D85 14 D320 1272	0177	C CP	14 50IXX		7201	NEW LEVEL, MODULO 5D IN UPPER	1914
1086 15 D294 1049 1087 97 1085 0942		J	15 XXXX2 97 CP	В		PERHAPS MOOIFY OYNAMIC LEVEL) IF BACKWARO L, SUBTRACT TAG-COUNT)	2150 1910
1088 44 1241 D743		R TA	44 YES	sw		IS A LOCATION AVAILABLE IN THIS GROUP	1644
1089 10 0167 1071		CAX	1D XXXX1			AOD IN TAGS FROM OPTIM	198D 2514
1090 11 DD0D DD01 1092 45 0546 D698		PK	11 000D 45 NZ	D001		TO CHANGE ADDING ORDER TO STORING ONE D. ADDRESS IS NOT 8001	2016
1093 35 DDD4 1311			35 DOD4			O-POSITION HOLDS O FOR D. 1 FOR I)	2040
1094 65 D197 0301 1095 10 D7D2 8003			65 ALOPT 10 C6	80D3		MODIFY TO USE ROUTINE FOR UNFIXED D) MODIFY BRINGING ORDER, AND BRING	824 2588
1096 11 1352 1046		.	11 0			ARE WE DONE	2592
1098 60 0152 0914 1099 69 00D1 1025		сх	60 R00D2 69 SETCC	SUB2R		ALPHABETIC D RESERVE AND PUNCH CARD	2334 2358
11DD 9D 0755 D905			90 SKP			O. SKIP BECAUSE COMP IS COUBLE	1714
1101 35 D0D4 0785 1102 65 0160 0766			35 0004 65 RODID	SE0		OPERATION 31. TAKE LARGER ADDENOS. IS THIS ANOTHER RBD CARD)	1830 2402
1102 65 0556 0611			65	SUB11		FINO BEST EOUIVALENT TO BLANK	1188
11D4 2D D959 0562 1105 93 D660 D71D	D959		20 BP1 93 XAS		BP1	INITIAL BRINGING ORDER) O, IT IS AN INOEXING OPERATION	1664 1802
1106 45 1260 1211			45 AAS	вт		O, I TAG IS NON-ZERO	1948
1107 46 0560 D311		с вот	46	2ND		D. WE WILL USE ONE MEASURED FROM D	848
1108 69 0911 DD63 1109 69 0114 0617			69 PRË 69 91STX	SUBR 9		ANALYZE ALPHABETIC I CHANGE ORUM TAG TO 9)	1294 1700
1110 2W 0186 0989	0186		24 POD1D		P0010	CONTROL INFORMATION FOR PUNCHING)	1928
1111 30 DOD2 D917 1112 65 0157 1212		J	30 DDD2 65 RODO7			INTERCHANGE AND MAKE NEGATIVE) NUMERICAL L	1878 2250
1113 69 0516 1070		N MAX	69 ON			AT TOP. SET SWITCH ON)	1678
1114 69 1018 1025			69	SUB2R		RESERVE FIRST CELL IN BANO	2382
1115 OD 0888 0469 1116 30 DDD8 0790		J	DO 0888 3D DD08	00001		TAGS AND EXIT FOR SUBROUTINE 11 REGION DESIGNATOR TO RIGHT ENO }	2134 2476
1117 44 1228 1278		J	44 NGI			O.RELOCATEO I IS EXCESSIVE	2290
1118 44 0D01 D934 1119 D0 DD0D D029		K 291XX	44 SETCC 00 DDD0	0029		O, OUIT BECAUSE WE HAVE FOUND LONG SYM	2508 2654
112D 24 D743 0496	0743		24 SW		SW	SECOND PART + BACKWAROS + CHANGE SWITCH	1694
1121 65 D178 D783 1122 65 D178 1D77			65 EXITY 65 EXITY	PAKT		O-POSITION HOLOS O FOR D, 1 FOR I) MODIFY EXIT)	2036 1704
1123 46 0676 0977			46	BAO		I, RELOCATED ORUM WILL EXCEED 1999	1390
1124 DO DODD 200D 12DO 19 9900 ODOD		K 27TH K 1200	DD 0000 19 9900	2D00 0000		FOR TELLING WHETHER DRUM OR CORE IF ORUM AOORESS, USE REGULAR EXIT	2062 344
1201 79 9900 DDD4		K 1201	79 9900	0004		IF NOT AN AODRESS, AOD 4	346
1202 80 D300 O0D2		K 1202	80 0300	DDD2		IF 800X ADDRESS AOD 2	348
1203 8D 04D0 DD04 12D4 80 07D0 0DD2		K 1203 K 1204	80 04D0 80 D700	0004 DD02		IF NOT AN AODRESS, AOD 4 IF 8Dox AODRESS, ADD 2	350 352
1205 89 9900 D004		K 1205	89 9900	0004		IF NOT AN AODRESS, AOO 4	354
1206 90 5900 0003 1207 99 9999 0DD4		K 1206 K 1207	90 5900 99 9999	0003 0004		IF CORE AODRESS, AOO 3 IF NOT AN AODRESS, ADD 4	356 358
1208 90 9090 8995		K 9D9	90 9090	8995	W		1576
1209 22 0167 8DD1 1210 69 8003 0566	0167		22 XXXX1 69 8003	8001	XXXX1	NEW AVAILABILITY WORD INTO ORUM) CLEAR DISTRIBUTOR	1736 1932
1211 10 0902 1310		с вт	10 0902			O TAG INTO UPPER	1952
1212 10 0151 1262 1213 69 0516 1120		N MIN	10 RD001			ALPHARETIC L	2252 1692
1214 45 1068 1329		N MIN	69 ON 45	OUT		SECONO PART, BACKWARDS. CHANGE SWITCH O, NOT BLANK. I. IT IS BLANK.	2386
1215 65 0536 D575		J	65 EOUIV	10004		BRING EOUIVALENT. MULTIBRANCH	2184
1216 46 0684 0D29 1217 65 0536 0120		J	46 65 EQUIV	D029 Q0D03		IF A OIGIT, TO BLR WITHOUT OESIGNATING BRING EOUIVALENT. MULTIBRANCH.	2480 2318
1218 11 0001 0001		P KA	11 ODD1	0001		TO CHANGE STORING ORDER TO ADDING ONE	2516
1219 61 1022 1069 1220 14 0774 1021		C NG	61 21XXX 14 41XXX	DON		MOOIFY EXIT FOR N G SYMBOL WHAT CELL OIO WE RESERVE)	1558 1746
1221 10 D167 1271			1D XXXXI	.50		INOEXABLE ADORESS INTO UPPER	2048
1222 16 DD95 0785 1223 10 D726 0681			16 OPTIM 1D CDIFF	SE0		REDUCE AOOENOS BY 1 FOR 80,82, OR 88 AOO RELOCATION AMOUNT	1848 1396
1224 90 D728 0419			9D	L00D2		D, DRUM NOT FULL. I, ORUM IS FULL.	2082
1225 15 D346 D751		,	15 AI	00000		NEW AVAILABILITY WORD INTO ORUM) AODEND AND EXIT FOR USE IN SUBR 18	1732
1226 DD 000D D476 1227 30 DDD3 0785		J	0000 30 DD03	DODD8 SEO		L-O ADOENOS TO LEFT END LOWER)	2138 1796
1228 30 D002 1239		N NGI	3D D002			FIX C.I. SO THAT I WILL NOT PUNCH)	2298
1229 00 DDDD 8D03 123D 69 1355 8DD3		K 80D3 J	0D 00D0 69 A0001	8D03 80D3		OUPLICATE INTO AVAILABILITY TABLE)	2026 2424
1231 20 D294 1297	D294	1.70	20 XXXX2		XXXX2	STORE OYNAMIC LEVEL+ RIGHT END WORD	1994
1232 69 DDD1 1D25 1233 1D DDD3 D7D9		J ZQ N BP	69 SETCC 1D READC	SUB2R SUB1D		TO RESERVING SUBROUTINE BY-PASS INVALID CARD	2444 236D
1234 OD DD8D DDD0		K 85TH	00 0080	DODD			2614

1235 98 8008 0000	K 8	98 8008	0000			1984
1236 20 0185 0938 1237 10 0590 8003	0185	20 P0009 10	8003	P0009	STORE CORE AOORESS FOR PUNCHING MAKE BRINGING OROER	2218 1962
1238 65 0159 0664	C PROI		8003		NUMERICAL I	2284
1239 10 0186 0544		10 P0010			FIX C.I. SO THAT I WILL NOT PUNCH)	2300
1240 69 0944 0042 1241 36 0000 1263	N YES	69	SU819		PROCESS L. IF REGIONAL OR SYMBOLIC WE FOUND A CELL. SHIFT AND COUNT	2532 1708
1242 30 0001 0999	N IES	36 0000 30 0001	Α		SHIFT RIGHT FOR CORE ADDEND	2056
1243 00 0808 0798	J	00 0808			TAGS AND EXIT FOR SUBROUTINE 13	2160
1244 24 0186 1294 1245 69 1555 0168	0186 0 QS	24 P0010 69 A0201	T0001	P0010	C.I. FOR AVAILABILITY TABLE) TO RESTORE BEFORE ENO OF JOB	2554 2606
1247 69 0197 1100		69 ALOPT			SHOULO WE RESERVE	1712
	1359 J SENO		A		OUPLICATE INTO AVAILABILITY TABLE)	2426
	0177 C LOOP 2225 K 1	20 P0001 250 23 2225	2400		STORE LOCATION OF AVAILABILITY WORD TABLE TO OPTIMIZE SHIFT OPERATIONS	2560 3 1 0
1251 07 0607 0600		251 07 0607	0600		TABLE TO OPTIMIZE SHIFT OPERATIONS	312
1252 07 0609 0800 1253 09 0811 1000		.252 07 0609	0800		TABLE TO OPTIMIZE SHIFT OPERATIONS TABLE TO OPTIMIZE SHIFT OPERATIONS	314
1254 11 1013 1200		.253 09 0811 .254 11 1013	1000 1200		TABLE TO OPTIMIZE SHIFT OPERATIONS	316 318
1255 13 1215 1400		255 13 1215	1400		TABLE TO OPTIMIZE SHIFT OPERATIONS	320
1256 15 1417 1600 1257 17 1619 1800		.256 15 1417 .257 17 1619	1600 1800		TABLE TO OPTIMIZE SHIFT OPERATIONS TABLE TO OPTIMIZE SHIFT OPERATIONS	322 324
1258 19 1821 2000		258 19 1821	2000		TABLE TO OPTIMIZE SHIFT OPERATIONS	326
	2023 K 1	.259 21 2023	2200	2023	TABLE TO OPTIMIZE SHIFT OPERATIONS	328
1260 65 0515 1211 1261 23 0167 0971	0167	65 110TH 23 XXXX1	вт	XXXXI	COUNT OF I TAGS IN LOWER STORE LAST 4 DIGITS OF OPTIM	1950 1 970
1262 69 1315 1024	0101	69	SUBR8		PROCESS L	2254
	0294	20 XXXX2		XXXX2	STORE THE COUNT	1710
1264 10 0320 0730 1265 65 0768 0611	N ON8	10 501XX 65	SU811		AOVANCE IT USUAL CASE: I BLANK AND NOT 0.	2390 2200
1266 24 1660 0029	1660 J ST	24 G0001	0029	G0001	STORE ADDRESS OF 0001 OF REGION	2492
1267 65 0095 0127 1268 24 0186 1240	J	65 E	Q0010	D0010	BRING VALUE OF I INTO LOWER	2338
	0186 0536	24 P0010 23 EOUIV	ABS		CONTROL INFORMATION) STORE EOUIVALENT	2530 1494
1270 15 8001 1227		15 8001			L→O AOOENOS TO LEFT ENO LOWER)	1794
1271 11 1124 0929 1272 65 8003 0179		11 27TH 65 8003	EXIT2		SUBTRACT 2000 TO DETERMINE RANGE NEW DYNAMIC LEVEL INTO LOWER	2050 1916
1273 65 0167 0177	J	65 XXXX1	EXITX		EOUIVALENT BACK TO LOWER AND EXIT	1408
1274 90 0978 0573 1275 15 0428 8002		90	10002		I ORUM IS FULL	2196
1276 00 0888 0477	J	15 00 0888	8002 00009		MAKE RRINGING OROER TAGS AND EXIT FOR USE IN SUBR 11	1840 2142
1277 65 1250 0706	J	65 1250			BRING SHIFT AOOENOS	1824
1278 69 1032 0677 1279 00 0000 8002	K 8002	69	1NOEX 8002		INOEX I	2292 2024
1280 69 1333 0740		69	SUB		TO SUBROUTINE	2450
1281 20 0167 1121 1282 65 0153 1016	0167	20 XXXX1 65 R0003		XXXX1	STORE AOORESS ALPHABETICAL I	2034 2460
1283 65 1680 0690	N OONE	65 ZEROX			CLEAR ACCUMULATOR	2428
1284 15 1344 1249 1285 60 8001 1292		15 RS1 60 8001	LOOP		INITIAL WORD SHOWING LOCATION OF TABLE PUT IT INTO UPPER	2558 2088
1286 65 0158 0614	C PROC				NUMERICAL O	2264
1287 45 0640 1042	0105	45 XY			I * 8002-8003 + WRONG PARITY	2008
1288 20 0185 1338 1289 69 0594 0661	0185 C S0	20 P 00 09 69	ALL SUBR 7	F0009	STORE I FOR PUNCHING STORE SYMBOL AND EQUIVALENT IN TABLE	2 2 96 23 54
1290 30 0004 0602		30 0004				2538
1291 15 0444 8002 1292 69 0595 1025		15 69	8002 SUB2R		MAKE SHIFTING OROER RESERVE AOORESS	1726 2090
1293 00 0809 0998	J	00 0809	5552		TAGS AND EXIT FOR SUBROUTINE 13	2222
1294 60 1348 1284 1295 00 1499 1499	K C7	60 A 1 00 1499	1499		VARIABLE 8RINGING OROER INTO UPPER TO MODIFY INDENTIFICATION AT ENO OF LI	2556 2612
1297 14 1022 1322	,	14 21XXX	14//		OIVIOE OYNAMIC LEVEL BY 2	1996
	1669	24 ORUMT			CHANGE ORUM TAG. ORUM CANNOT BE FULL.	2448
1299 20 0179 0745 1300 19 9906 0690	0179 K 1	20 P0003 300 19 9906	0690	F 0003	STORE LOCATION OF AVAILABILITY WORD TABLE TO OPTIMIZE INDEXING OPERATIONS	2564 3 3 0
1301 80 0008 0880	K 1	301 80 0008	0880		TABLE TO OPTIMIZE INDEXING OPERATIONS	332
1302 80 0106 0680 1303 80 0209 0880		.302 80 0106 .303 80 0209	0680 0880		TABLE TO OPTIMIZE INCEXING OPERATIONS TABLE TO OPTIMIZE INCEXING OPERATIONS	334 336
1304 80 0308 0980		.304 80 0308	0980		TABLE TO OPTIMIZE INDEXING OPERATIONS	338
1305 99 9908 0880 1306 24 0095 0648	K 1	.305 99 9908 24 OPTIM	0880	OPTIM	TABLE TO OPTIMIZE INCEXING OPERATIONS STORE OPTIMIZING ACCENOS AND TAGS	340 1966
1307 11 0610 0415	0095	11 QB		OFTIM	MAKE ORUM AVAILABLE)	974
1308 00 0000 0090	K 99TH	X 00 0000	0090		WHAT CELL OIO WE RESERVE)	2660 1744
1309 30 0004 1220 1310 44 0464 0 514		30 0 0 04 44	UM		O. D TAG IS NON-ZERO	1954
1311 15 0564 8002		15	8002		BRINGING OROER	2042
1312 69 0666 1024 1313 35 0001 1270		69 35 0001	SUBR 8		PROCESS 0 L-0 A00ENOS TO LEFT ENO LOWER)	2268 1792
1314 11 0159 0716		11 R0009			SUBTRACT ENO OF AREA TO BE RESERVEO	2394
1315 44 1321 1324 1316 35 0008 1040	J	44 NGL 35 0008			O, RELOCATEO L IS EXCESSIVE CLEAR ALL EXCEPT LAST CHARACTER)	2256 2504
1317 15 1019 1082	N O	15 ODIFF	CO		A00 ORUM RELOCATION AMOUNT	2370
1318 24 0185 1290 1319 69 8003 0776	0185 C LR	24 P0009 69 8003		P0009	STORE LAST 4 DIGITS OF CONSTANT IN I CLEAR DISTRIBUTOR	2536 1552
1320 65 0062 0967	C LR	65 OPREG			WHICH ONE OO WE USE)	1886
1321 10 0186 1343	N NGL	10 P0010	EVA		FIX C.I. SO THAT L WILL NOT PUNCH)	2260
1322 44 1076 1026 1323 65 8002 0731		44 65 8002	EVN		O, OYNAMIC LEVEL IS 000. CLEAR UPPER	1998 1 43 0
1324 20 0182 1286	0182	20 P0 0 06	PRO0	P0006	STORE L FOR PUNCHING	2 25 8
1325 69 0179 0632 1326 30 0001 1083	N NGO	69 EXITZ 30 0 0 01			IF BACKWARO L. SUBTRACT TAG-COUNT) FIX C.I. SO THAT O WILL NOT PUNCH)	1906 2 2 78
1327 65 8002 0985		65 8002	вотн		OOD. SEPARATE LAST ADDENO.	1896

1328 00 8000 0000	K 83R0	0D 8D0D	0000		2374
1329 70 0151 11D2	N OUT	70 RDD01		WHEN DONE, READ NEXT CARD	24D0
133D 65 0159 1066		65 RD009		NUMERICAL I INTO LOWER	2464
1331 00 0001 1236	J	00 D001		A00ENO ANO EXIT FOR SUBROUTINE 18.	2216
1332 10 0158 0179	C BL	10 RODO8	EXITZ	NUMERICAL O INTO UPPER	2468
1333 69 D001 1075	J	69 SETCC	SUB2U	TO UNRESERVING SUBROUTINE	2452
1334 15 D695 1299		15 C3	·	MODIFY IDENTIFICATION OF WORD	2562
1335 65 D292 1337		65 ORCEQ	MW	DYNAMIC LEVEL OF LAST CORE ADDRESS	2106
1336 20 D184 1238 D184		2D P00D8	PROI	PD008 STORE 0 FOR PUNCHING	2276
1337 15 0545 0335	C MW	15 COUNT	SB10C	CORE OR DRUM. ADD TAG-COUNT TO DYN LV	2108
1338 6D D003 0D57	C ALL	60 REAOC	SB10A	PREPARE TO PUNCH AND READ NEXT CARO	2304
1339 45 0644 0694		45 ALL		I, IT IS ANOTHER RBD CARD	2406
1340 24 0183 0994 0183		24 P0007		PD007 STORE FIRST 2 DIGITS IN OP POSITION	2542
1341 10 0294 0649		10 XXXX2		WHAT CELL DIO WE RESERVE)	1754
1342 OD 0890 0418	J	00 0890	L0001	TAGS AND EXIT FOR USE IN SUBR 11	210D
1343 21 0186 1286 0186		21 P0010	PRO0	PODID FIX C. I. SO THAT L WILL NOT PUNCH)	2262
1344 00 0000 0450	K RS1	00 DODD	045D	INITIAL IDENTIFICATION OF WORD	26D8
1345 45 0596 0646	_	45	SOD	IF O IS BLANK, WE SHOULD STORE ZERO	2622
1347 16 0536 1092		16 EQUIV		SUBTRACT THE ADDRESS IN OUESTION	2D14
1348 69 1355 0168	P A1	69 A0001	TD001	INITIAL VARIABLE BRINGING ORDER	2600
1349 20 0185 0795 0185		20 P0009		PDD09 STORE LOCATION OF AVAILABILITY WORD	2568
1350 69 0154 1268		69 R0004		CONTROL INFORMATION)	2528
1351 66 0792 0935	N OK	66 INO	Р	MAKE NEGATIVE, BUT DO NOT INTERCHANGE	1882
1352 69 1555 0172	QQ	69 A0201	T0005	COMPARISON CONSTANT FOR ENO OF JOB	26D4
1353 90 1008 1058		90	BB1	O, THERE WAS A BLANK BACKWARDS L	1236
1354 60 1355 1088	Q 600	6D A00D1	TA		1764



U.S. DEPARTMENT OF COMMERCE Frederick H. Mueller, Secretary

ATIONAL BUREAU OF STANDARDS A. V. Astin, Director



THE NATIONAL BUREAU OF STANDARDS

scope of activities of the National Bureau of Standards at its major laboratories in Washington, D.C., and builder, Colo., is suggested in the following listing of the divisions and sections engaged in technical work. In al, each section carries out specialized research, development, and engineering in the field indicated by its e. A brief description of the activities, and of the resultant publications, appears on the inside of the front cover.

ASHINGTON, D.C.

LECTRICITY. Resistance and Reactance. Electrochemistry. Electrical Instruments. Magnetic Measurements. lectrics.

METROLOGY. Photometry and Colorimetry. Refractometry. Photographic Research. Length. Engineering It trology. Mass and Scale. Volumetry and Densimetry.

EDAT. Temperature Physics. Heat Measurements. Cryogenic Physics. Rheology. Molecular Kinetics. Free Addicals Research. Equation of State. Statistical Physics. Molecular Spectroscopy.

ADIATION PHYSICS. X-Ray. Radioactivity. Radiation Theory. High Energy Radiation. Radiological Juipment. Nucleonic Instrumentation. Neutron Physics.

THEMISTRY, Surface Chemistry, Organic Chemistry, Analytical Chemistry, Inorganic Chemistry, Electroposition. Molecular Structure and Properties of Gases. Physical Chemistry. Thermochemistry. Spectrochemrry. Pure Substances.

A ECHANICS. Sound. Pressure and Vacuum. Fluid Mechanics. Engineering Mechanics. Combustion Controls. ORGANIC AND FIBROUS MATERIALS. Rubber. Textiles. Paper. Leather. Testing and Specifications. Polymer Structure. Plastics. Dental Research.

METALLURGY. Thermal Metallurgy. Chemical Metallurgy. Mechanical Metallurgy. Corrosion. Metal Physics. MINERAL PRODUCTS. Engineering Ceramics. Glass. Refractories. Enameled Metals, Constitution and M crostructure.

BUILDING RESEARCH. Structural Engineering. Fire Research. Mechanical Systems. Organic Building Maberials. Codes and Safety Standards. Heat Transfer. Inorganic Building Materials.

APPLIED MATHEMATICS. Numerical Analysis. Computation. Statistical Engineering. Mathematical

DATA PROCESSING SYSTEMS. Components and Techniques. Digital Circuitry. Digital Systems. Analog Systems. Applications Engineering.

ATOMIC PHYSICS. Spectroscopy. Radiometry. Mass Spectrometry. Solid State Physics. Electron Physics. Atomic Physics.

INSTRUMENTATION. Engineering Electronics. Electron Devices. Electronic Instrumentation. Mechanical Instruments. Basic Instrumentation.

Office of Weights and Measures.

CRYOGENIC ENGINEERING. Cryogenic Equipment. Cryogenic Processes. Properties of Materials. Gas Liquefaction.

IONOSPHERE RESEARCH AND PROPAGATION. Low Frequency and Very Low Frequency Research. Ionosphere Research. Prediction Services. Sun-Earth Relationships. Field Engineering. Radio Warning Services. RADIO PROPAGATION ENGINEERING. Data Reduction Instrumentation. Radio Noise. Tropospheric Measurements. Tropospheric Analysis. Propagation-Terrain Effects. Radio-Meteorology. Lower Atmosphere Physics. RADIO STANDARDS. High frequency Electrical Standards. Radio Broadcast Service. Radio and Microwave Materials. Atomic Frequency and Time Standards. Electronic Calibration Center. Millimeter-Wave Research. Microwave Circuit Standards.

RADIO SYSTEMS. High Frequency and Very High Frequency Research. Modulation Research. Antenna Research. Navigation Systems. Space Telecommunications.

UPPER ATMOSPHERE AND SPACE PHYSICS. Upper Atmosphere and Plasma Physics. Ionosphere and Exosphere Scatter. Airglow and Aurora. Ionospheric Radio Astronomy.

